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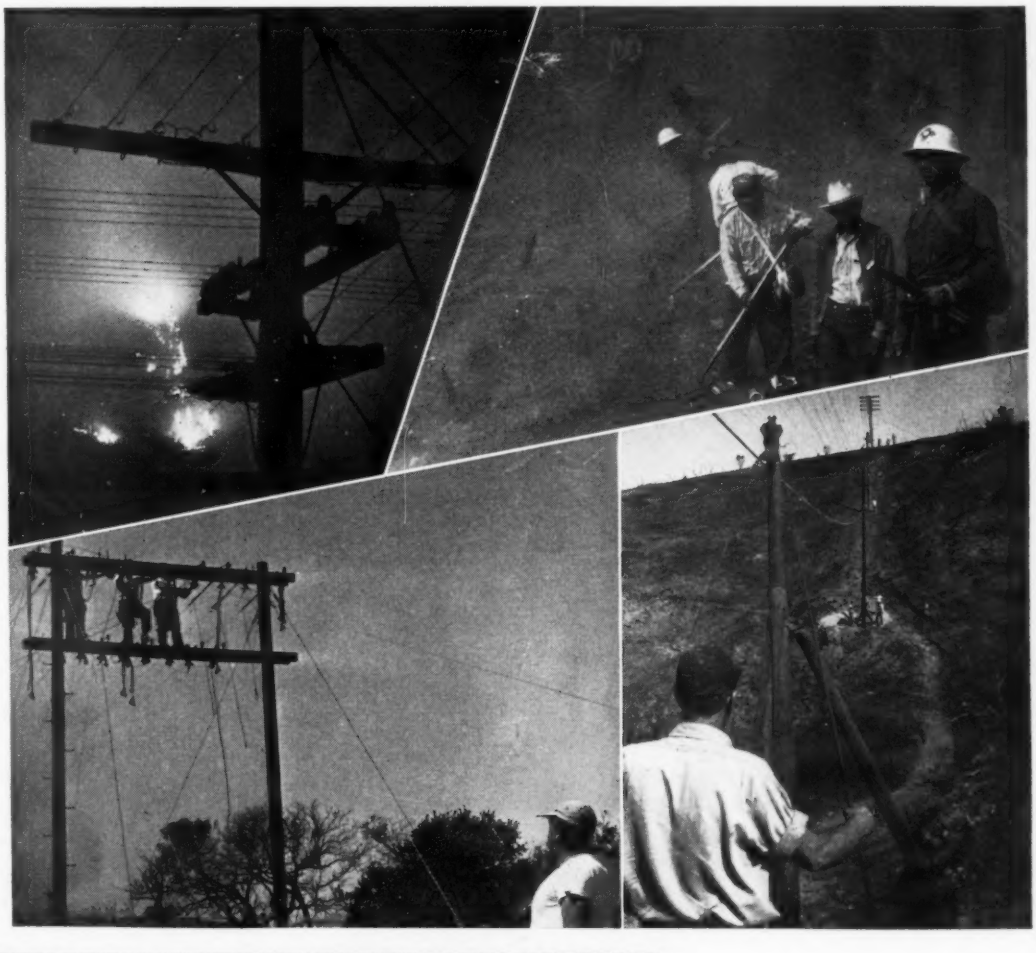
THE JOURNAL OF THE TELEPHONE INDUSTRY



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KEEP LINES WORKING

Linemen of General Telephone Co. of California and the Sia Indian fire fighters work together in fire that recently swept through the Santa Ynez Mountains. See p. 28 for full story.

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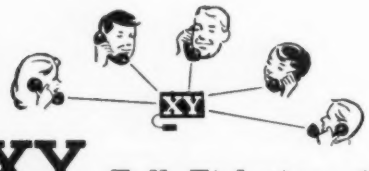

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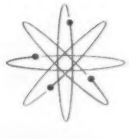

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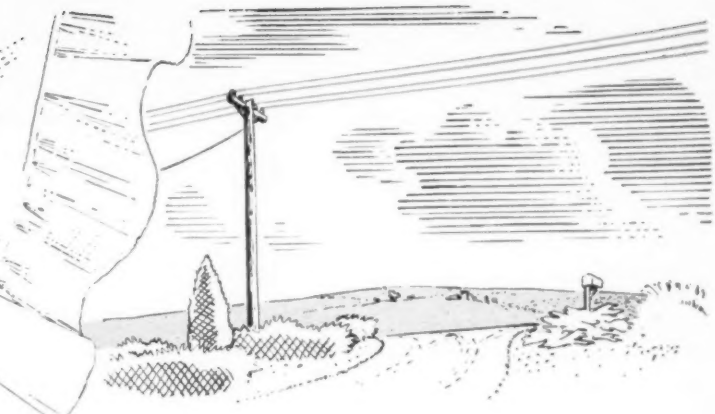

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FLASHES AND PLUGS

ANYTHING CAN HAPPEN. Over in France, Baptiste Trivella lifted the receiver of the old model telephone in a coffee shop at Saorge, near Nice, and tried to talk to his boss, a lumberman.

He raised his voice higher and higher but couldn't make himself heard. Meanwhile, coffee shop customers snickered and guffawed.

Finally, he put his mouth close to the old-fashioned, trumpet-shaped mouthpiece and blew hard to unplug it.

A small snake, hidden in the mouthpiece, bit him on the lip and hung on for several seconds.

Trivella was hospitalized, but is expected to recover.

•

THE LONG VIEW. A report from England, date-lined Beckenham, Sept. 26, by the Chicago *Tribune*, indicates that perhaps occasionally mass production in government building construction becomes a little too impersonal. The story:

Mrs. Evan Haines was quoted as saying that today there are 350,000 people on a waiting list for telephones, but the government is installing a telephone she doesn't want.

Mrs. Haines said she saw a man digging a hole outside the apartment house where she lives and asked him what he was doing.

"Just laying on your new telephone," he said.

"But I don't want a telephone."

"I've got my orders," said the workman, continuing his digging.

In the next few days more workmen came. They bored a hole through a garden wall, dug up part of the lawn, laid a cable and strung a wire up the side of the apartment building.

Mrs. Haines appealed to the local council, which owns the low-rent housing block.

"They said there was nothing they could do about it," she reported.

The Post Office, which maintains Britain's state-owned telephone system, said:

"We know Mrs. Haines doesn't want a telephone, but in the future some other tenant of her flat may have different ideas."

•

REPORT VERIFIED. An excited Marshall, Tex., telephone operator called police, told them a receiver was off the hook at a local residence and that she could hear sounds of violence.

Police sped to the address and learned she was 100 per cent correct.

They found the family clustered about a television set watching a shoot-'em-up program.

CIRCULATION

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Since 1901

October 8, 1955

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IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

This is an address which Mr. Welch gave before the Public Utilities Association of the Virginias on Sept. 17 at White Sulphur Springs, W. Va. He discusses the subject "Public Relations of Public Utility Regulation."

THE SUBJECT of my remarks, "The Public Relations of Public Utility Regulation," may strike you as the use of familiar terms in a rather strange combination—something like a chestnut horse linked up with a horse chestnut. All of you are aware, I am sure, of the importance of public relations to the utility business, as such —and also of the importance of public utility regulation to the utility business, as such. But the idea that public utility regulation of itself requires special treatment and attention, from the standpoint of public relations, may strike you as a new approach.

I can understand that reaction. But I am going to suggest to you that the public relations needs of public utility regulation are, today, a problem more challenging, more pressing than any public relations program devoted exclusively to utility business, strictly as a business. As I view the matter, the public relations of regulation—including both state and federal commission regulation—are like an outer defense bastion, or protecting levee, for our essential utility industries. This form of regulation is supposed to protect these industries against the flash floods of hasty or unreasoning waves of public criticism which can result from a steady deluge of political propaganda.

Utilities as Political Issue

As a practical Washington observer in the utility field, I regret very much that the so-called public power question seems certain to become a much discussed, if not a major, issue between our two great political parties in the election next year. I regret it because it is a phony issue. It is an economic question which ought to be discussed on its own merits, regardless of party politics. But whether we like it or not, that is the way things are now shaping up. Public utilities of all kinds, gas and telephone as well as the electric companies concerned, must realistically expect that such questions as rates, service and organization policies will be dragged into the area of political controversies repeatedly over some of the most absurd and trivial charges about Dixon-Yates, and the gas producer question, and vague criticism of giveaway and monopoly.

There is all the more reason for the utility companies, with this 1956 baptism of fire staring them in the face, to put their best efforts now into a preparatory program of public opinion education. It is not any too soon to start stocking up with defense ammunition. And I know of no better, no more pressing place to start than to tell the story of regulation, because that is one of the indispensible foundation stones upon which successful operation of American utility enterprise rests.

Successful? How successful? All of us here, today, know the answer to that question. We all know that by any fair and reasonable standard, public utility service in this great country is best by test in comparison with any in the entire world. . . .

Some Discredit Our System

Is this success? Well, a citizen of France would think so, or a citizen of Italy or England, or certainly Russia, or the Iron Curtain countries, would think so. None of these countries have public utility regulation as we have it because they are generally committed to government operation of their utility services. But the very fact, and it is a fact, that we have more and better utility service in this country, readily available and commonly used, without rationing or restriction, by a far greater proportion of our mass population—at rates they can well afford to pay — speaks for itself. It would seem to be a complete answer to the success of our American system of regulated private enterprise, as compared with government-operated monopolies abroad. But strange as it may seem, there are quite a few people in this country who do not agree, who seem to be engaged in a systematic campaign to discredit—if not destroy—our traditional American plan of utility regulation and substitute for it the European plan, or government monopoly.

Now when we are confronted with such a paradox—the paradox of a system which is so demonstrably successful in fact, but which is nevertheless subject to criticism by some presumably responsible people who seem to be in favor of switching to an inferior substitute—we have a prime example of a public relations problem. We have a situation where a really successful and superior product is being discounted by sheer lack of understanding or general acceptance of its true qualities. . . .

Without commission regulation we would not have this high degree of development and successful physical operation that American utilities now enjoy. Take away or destroy this peculiarly American system of commission regulation, which has only been in operation on a full-term and full-powered basis for about 50 years, and what would we have? There is only one answer — we would have government monopoly. . . .

Regulation Must Work

Commission regulation must not only work well, and I am confident that it does work well, but we must also convince the American people that it works well, that it protects them, along with the utility investors, by a fair and com-

petent system of rate and service and other controls. . . .

This brings us . . . to the importance of doing something about obtaining better understanding and acceptance of commission regulation now, while there is time and opportunity to hold on to that which has proven itself. That means improving the public relations of regulation, itself.

Now we have all heard various definitions of public relations and I am not going to go into a detailed or abstract discussion of the public relations concept. I only want to suggest, by way of taking a fresh look at an old subject, that public relations should mean just what those two simple words imply—having relations or a line of communication and understanding with the public. The very word "relations" connotes a two-way or reciprocal arrangement. When you say this man is a relation of yours — let us say a cousin — it goes without saying that you are a relation or cousin of his. It would be a very poor and unsatisfactory line of communication which only worked in one direction. True communication is a two-way proposition.

And that, I am convinced, is the real problem to be licked in connection with improving the public relations or general acceptance of commission regulation. It is not enough to tell our people and others—our employes, our investors, and the consuming public — what regulation is and how it works. We have got to be sure that somebody is listening, that somebody interested is listening, that there is some good reason why they should listen, that the information is getting across accurately at least in a general way.

Must Educate Customers

It is a fact that a good many utility customers do not know what commission regulation is. You may have heard of opinion surveys taken by various utility organizations from time to time which show some astonishing misconception about how our utility services are operated and regulated. Some few people are under the impression that the government already owns and operates these utilities in some way. An even larger proportion seems to be totally unaware that there is a government agency which protects them by fixing the rates on a fair basis which the utility company can charge the public. They seem to think that the utility company charges as much or as little as it pleases, without outside interference. And almost as a corollary of such a wrong impression, a good many are convinced that rates are too high. They may not even know, when asked, what their particular rate is—but they are sure it is too high.

It is not surprising, therefore, in such a state of public misunderstanding to find some of the most fantastic ideas about utility profits. The fact that employe payrolls take far more money out of the utility business than the investor-owners, seems to be understood by only a small minority. The fact that, in some instances, government taxes of all kinds may actually take more money out of a utility business than the employes and investor-owners combined is another thing rarely understood.

But, we do not have to go to the man on the street, or the average busy workingman customer, who has plenty of problems of his own to worry about. We can go into our colleges and universities and pick up text books on public utility economics and finance. And what do we read in them about commission regulation? Is it hailed as a success? Do these books say that, by and large, it is working out all right or that it is preferable, from the standpoint of public interest, to any other system being used for utility services elsewhere in the world? I wish I could say they did. But, to my way of thinking, some of the most unfair and uninformed criticism of regulation can be found in texts used to instruct our college and professional people. Small wonder that the late Wendell Wilkie, one of your own great utility officials, confessed that he was a campus convert to Socialism and that he had to make his own living out in the business world for several years before he really understood how a dollar is made and what really "makes the mare go"!

Tell Story Over and Over

Alright, let us agree, therefore, that commission regulation is not generally understood or that it is not as well appreciated as it ought to be, the next question is what to do about it. And the answer, to my mind, is surprisingly simple. The story of regulation must be told over and over again. It must be told simply and in the alternative, it must be told in detail. It must be spelled out in dollars and cents and translated in terms of self-interest, so that the utility consumer, when he gets his bill, will realize that it is to his advantage that commission regulation exists. Show me a man or woman who will turn a deaf ear to something which is to their advantage, and I will show you a very rare individual indeed.

I realize, of course, that some excellent things have already been done along these lines for many years. I have seen some outstanding, and highly entertaining motion picture films, employe educational brochures, messages to investors, and publications designed for the consumers and general public—all explaining and stressing the importance of regulation in the operation of our utilities. But, still we obviously do not have enough effort or we could not be getting so many of these fantastic answers to customer surveys. In my own editorial work, we have had the privilege of publishing some fine articles. We need more. We need more mass distribution. We need more people seeking more opportunities to tell the story. Only by constant, unobstrusive repetition—along the lines of some of our familiar advertising slogans, such as the "pause that refreshes" can the basic truth of commission regulation as a protective and constructive force in the public interest sink in to the public consciousness. It is as simple and as difficult as that. . . .

Umpire Is Needed

The question is often asked how the public utility companies themselves, feel about regulation. When we read in the newspapers about some public utility official complaining because he does not think the commission was liberal enough in fixing rates, or when we read about the public utility companies fighting the commission's orders in the courts, the public might get the impression that the public utility companies are not very much in favor of commission regulation. I think all of us here will agree that it is not true.

Modern public utility company officials almost without exception look upon commission regulation as a valuable institution. It is designed to protect both the consumer and the owners of property, while at the same time maintaining the confidence of the public in the industry as a public service. This does not prevent individual utility companies from having very aggressive differences of opinion with the commission over such things as how much of a rate increase ought to be allowed. And, it is not unusual for a utility company to take a commission rate order into court.

That is the way the system should work, and I'm not suggesting here that a utility should pull any punches in insisting on what it believes to be fair to its investors or in the public interest.

The situation might be compared with players in a baseball game and their attitude toward the umpire. They may argue very frequently with the umpire. They may, on rare occasions, even appeal his decision to higher baseball authorities. But no responsible ball player would ever consider doing away with the umpire altogether.

(Please turn to page 38)

NEW DEVELOPMENTS

in Independent Telephony

By RAY BLAIN

THIS is the third article in a series of four, in which the technical editor of TELEPHONY describes various new items of equipment, which should be of interest to all progressive independent telephone companies. The second article appeared in the Oct. 1 issue. Readers desiring more information on any of the products described may write to Mr. Blain in care of TELEPHONY.

Pengo Duct Rodding Machine. This machine has been developed for the purpose of rodding telephone and power underground conduits. It may be used for rodding ducts for a distance of more than 1,000 feet between manholes. It has been proved in actual service, as one large utility company rodded more than 13,000 feet of ducts in one day. The power drive pays out, returns or holds the rod steady without shifting or stopping.

The rod capacity of the machine is a maximum of 1,400 feet of No. 0 or ⅛ inch diameter oil tempered spring steel wire. A length of 1,100 feet will be supplied with the machine unless otherwise specified. The rodding wire may be fed in either direction while rotating by means of a single control. When the wire is not rotating it may be fed in either direction by means of the reverse gear on the four-speed transmission. Throttle, transmission lever, carriage brake, rod control, footage counter and tachometer are located conveniently to the operator.

A 20-foot wire guide hose with spring steel lining and support stand are supplied with each unit. Red blinking warning lights on the front and back of the unit are supplied as standard equipment. The rodding unit fits most 1½ and 2-ton truck chassis (84 inches, back of cab to center line of axle). Power take-off (PTO) on the right side (opposite to driver) of transmission is preferred. (Left PTO can be used if necessary.) In operation, the truck driver leaves his motor idling and takes up his position on the metal seat back of the control wheel on the rear of the machine, and has complete control of the entire operation without assistance. *(See Fig. 14.)*

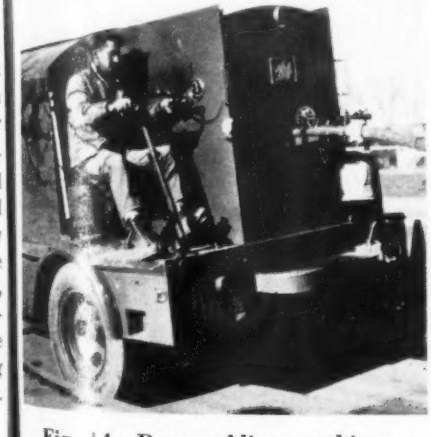


Fig. 14. Duct rodding machine.

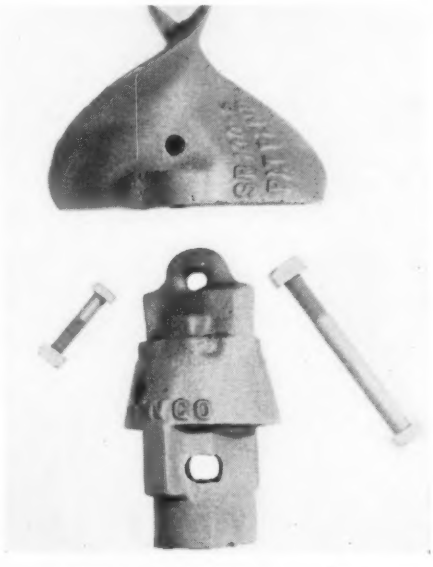


Fig. 15. Fishtail screw bit.

Fig. 16. Hydraulic cable reel carrier.

Fishtail Screw Bit. This is a revolutionary type screw bit designed for use with any continuous helix type auger for horizontal or vertical drilling. It bores clean, straight holes of specified diameter and requires less power to operate. This screw bit is a radical design tending to screw itself into the ground and permit very fast and economical drilling. It is constructed of tough cast alloy steel, heat-treated to resist abrasion, distortion and shock and assure long life. Holes from 2½ inches to 10 inches in diameter and to a depth of 300 feet may be bored. *(See Fig. 15.)*

Hydraulic Cable Reel Carrier. This carrier is engineered for the safe and fast handling of cable reels up to 96 inches in diameter and 52 inches in width, and 14,000 pounds in weight. The entire loading operation is accomplished by one man easily and safely in six to eight minutes. Lifting of the reels is accomplished by means of easy-to-operate heavy duty hydraulic hand

pumps which permit operation either in connection with a truck or as a self-contained unit. The use of independently operated cylinders for each side permits leveling of the reel, compensating for the slope normally encountered in cable laying operations.

Sturdy mechanism to lock the carrier in the raised position removes road shock from the hydraulic cylinders, assuring extended life of the unit. The reel spindle bar is also suspended on heavy duty, easy riding springs which further reduce road shock.

The carrier is safety positioned at all times through direct connection to the truck pintle hook or through the use of the hydraulic landing gear at the front and jack leg supports at the rear. The cable reel is securely locked into position with ¾ inch by 2½ inch steel bars before lifting.

The operator is in complete safety while lifting or lowering the reel, his position being several feet away from all working parts which are shielded as an additional precaution. Safety chains and electric break-away brake switch prevent run-away accidents. All wires and hydraulic lines are adequately shielded. *(See Fig. 16.)*

Cable Leak Detector Applicator. This applicator is designed for use in connection with a chemical leak detector in the inspection of lead-covered cable. The cable being checked is placed under pressure and then sprayed with the chemical leak detector by the use of the applicator. Bubbles or foam on the cable sheath will indicate a fault.

The single wheel type applicator is designed for use on aerial cable and terminals which are accessible. The double wheel type is recommended for use on aerial cables where difficult-to-reach locations, such as over trees, are involved. This unit can be placed on the cable by the use of extension poles or by climbing. The double wheel unit can be pulled up by a rope at walking speed which will prove satisfactory for covering the cable with the proper amount of the chemical solution. The single wheel unit can generally be handled from the ground by the use of a tree trimming pole. Men using the applicators should always wear special goggles provided for safety protection. *(See Fig. 17.)*

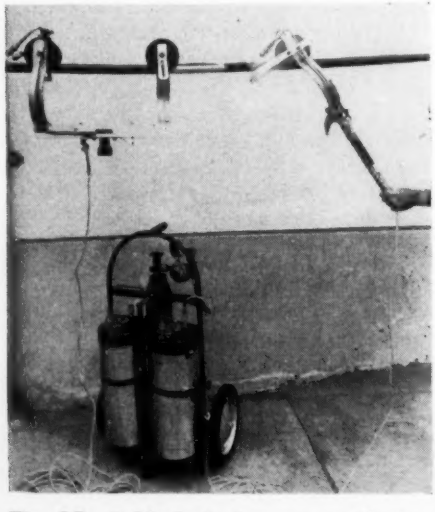
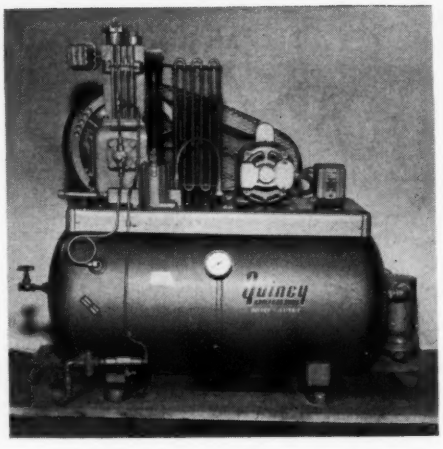


Fig. 17. Cable leak detector applicator.



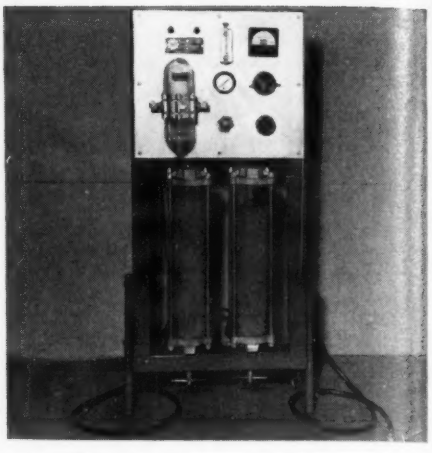


Fig. 18. Compressor dehydrator unit.

Compressor Dehydrator Unit. There is little doubt that in the very near future practically all exchange cable systems will be maintained under pressure. In this day and age, telephone service is too important to tolerate interruptions because of cable failures. Then, too, cable failures are expensive. The practice of maintaining exchange cables under pressure in the past has been discouraged because of the difficulty and expense of making old cables air-tight. This task has now been made both expedient and inexpensive by the use of the chemical leak detector. Another advantage and economy is the use of an air compressor with proper air dryers and regulators to maintain a constant pressure at all times on the various cables in an exchange. This arrangement proves less expensive and equally as satisfactory as oil pumped nitrogen supplied in tanks.

One type of pressure system is equipped with a dry air flow unit consisting of 10 flow meters. It will provide the proper amount of air for 10 cables. It will also indicate the cubic feet of air per hour consumed by each cable. The air compressor used with this unit will deliver 4.6 cubic feet of air per minute.

When any cable develops a leak, it will be detected instantly on the flow meter. The pressure gauge on the panel is of the safety type and will indicate by a red light that the pressure is above or below the normal operating pressure. An alarm can also be tied in with this indicator light and located as desired. The hour meter is provided for maintaining a record of hours the air compressor operates so as to designate a routine time for checking and changing oil, and cleaning the filter on the air intake. Oil pumped nitrogen in tanks is also provided to replace the air from the compressor and maintain the cables under the required pressure in the event of a failure of the commercial power supply.

Moisture is removed from the air by using Silica-Gel. Each container holds 8 pounds and will filter moisture out of the air at 30 pounds pressure. The action of the Silica-Gel can be observed at all times. *(See Fig. 18.)*

Substation Fuse. The recent revision of REA specification PE-11 requires that substation protector fuses be capable of interrupting 300 amperes at 3,000 volts, or 10,000 amperes at 600 volts. One manufacturer has announced development of a fuse capable of meeting these requirements. Initial deliveries are scheduled for the first quarter of 1956.

The main features claimed for this new fuse are:

(1) Use of steatite for the shell in place of fibre. Steatite is a ceramic material which is said to be more appropriate for applications where high temperatures may be encountered when the fuse ruptures. Although steatite and other ceramics have had limited use in the past, fibre has been the standard material for many years.

(2) Gravel filling in the shell. The fuse wire is surrounded with fine silica gravel. The high heat capacity of the gravel limits the temperature rise during fusing and thus limits expansion of gases within the shell. Heretofore, it has been considered necessary in most cases to vent the shell to permit the expanding gases to escape; if confined, they might explode the shell. In the presence of heavy fusing currents, metallic vapors expelled from the shell through the vent form a conductive cloud inside the protective cover through which an arc can be struck to bypass the fuse. The temperature-limiting effect of the gravel makes venting of the shell unnecessary.

(3) Fluxed fuse wire. Earlier de-

signs of fuses have shown a tendency to rupture erratically at low values of overcurrent. One cause of this is a film of oxide that forms on the surface of the fuse wire. The oxide has a higher melting point than the base metal. Thus, with low overcurrents, the oxide film sometimes remains as a thin-walled tube to conduct even after the metal has melted. Use of a wire similar to ordinary flux-core solder avoids this difficulty. The flux dissolves the oxide, leading to quick and consistent rupture on minimum values of overcurrent.

(4) Fast action. The fuse will clear 300 amperes at 3,000 volts, or 10,000 amperes at 600 volts in 50 milliseconds or less. This very fast clearance time is additional protection for the apparatus guarded by the fuse.

Cellular Polyethylene-Insulated Telephone Cable. The manufacturer of this new plastic cable claims the following advantages for it: Full color coding, lighter weight and smaller diameters. Color coding provides readily identified pairs in sizes 11 to 51 pairs in 19, 22 and 24-gauge. Standard color coded cable is also available in sizes 76 to 909-pair in 22 and 24-gauge. The 11, 20, and 51-pair cables constitute the sizes most generally used in cable plant distribution. This feature will permit the cable to be installed without ringing out or probing for pairs in cutting in terminals and loading coils. Terminal count changes will also be easier and maintenance costs reduced. Strict conformance to splicing like colors together throughout the plant must be followed in order to realize these advantages.

The smaller cable diameters obtained through the use of cellular polyethylene will reduce the ice and wind load on the cable in aerial installations which can mean longer spans or a smaller messenger strand or a greater factor of safety under storm loading. Further, the smaller diameter will permit the use of cables with a greater number of pairs in duct installations where size limitations exist.

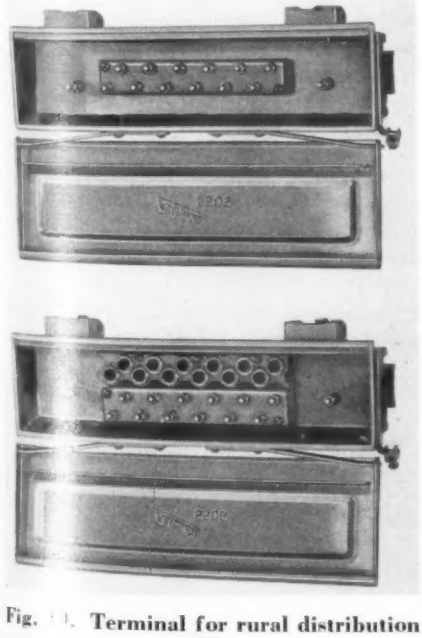


Fig. 19. **Terminal for rural distribution cable.**

Fig. 20. Hands-free telephone.

Terminal for Rural Distribution Cable. Several new wire terminals providing protected or unprotected termination points for rural distribution wires and plastic jacketed cable have recently been developed. Two of the new units, protected and unprotected, are shown in *Fig. 19.* The new terminals include 6, 11 and 16-pair units which, with the 1, 5 and 6-pair terminals manufactured for many years, cover all junction point requirements between drop wire and bridle wire, between drop wire and rural distribution wire, and for terminating plastic jacketed cable.

When equipped with Reliable No. 506 protector units, the new terminals can be used to protect cable from lightning discharges and power fault currents and as protected distribution terminals. By employing a Reliable No. 504 protector unit, the terminals provide multiple fuseless station protection. The protected terminals have cast aluminum housings as used in the Reliable "Type ST" strand terminals. The design of the aluminum cover closure and the neoprene grommets in the wire entrance holes make the terminals weathertight. The bronze binding posts are equipped with four washers and two nuts. This permits permanent termination of rural distribution wire or cable conductors under the bottom nut. Drop or bridle wire is placed under the top nut. External ground posts provide for termination of No. 6 copper ground wire, support wire, or cable shield wire. Internal ground posts can be used to terminate station ground wires.

The unprotected terminals are available with cast or formed aluminum housings with a porcelain binding post block or with a cast aluminum housing and resin filled block. The binding post blocks can also be purchased separately for use in building terminal boxes or similar housing.

Brackets supplied with the terminals facilitate mounting on poles or crossarms.

Hands-Free Telephone. One manufacturer has just announced a new hands-free telephone. One feature of the instrument is its ease of installation. Only three steps are involved: Connection of the line cord to terminal box; power cord to any 110-volt ac outlet, and microphone cord to a jack on the instrument.

The speaker is contained in the base of the telephone but the microphone is separate so that the mike can be passed around in conference groups. Controls include push button for ON and OFF, a volume control and a special "meeting" button. This latter allows anyone using the telephone in conventional manner (with the handset) to shut off the mike temporarily so that the listening party cannot hear extraneous conversation going on in the room. Reverting from loudspeaker to handset operation, or vice versa, is a split-second operation at the user's wish.

The manufacturer also points out that two or more hands-free instruments may be used "back-to-back" with complete satisfaction. This telephone is also equipped with automatic volume control. If a subscriber uses the mike too close to his mouth there is an automatic compensation to prevent the usual unpleasant "boom." *(See Fig. 20.)*

Heavy-Duty Portable Electric Hack Saw. This unit is self-powered and is designed for making straight, circular and random cuts in practically any material, including wood, stainless steel, tempered aluminum and mild steel. Cuts nine times as fast as a hand hack saw. This tool will prove convenient on numerous jobs around any telephone exchange.

This compact, self-contained unit measures 15½ inches over-all and

(Please turn to page 38)

Fig. 21. Portable electric hack saw.

Repairmen viewed through gnarled and burned California underbrush near Santa Barbara, restore the fire-damaged arm of a telephone pole, while the pole itself thoroughly covered in creosote, remains intact.

. . . KEEP THE LINES WORKING

The watchword of the men of General Telephone Co. of California of Santa Barbara, Cal., during the devastating fire through Santa Ynez Mountains.

By GEORGE A. BRIDGES*

TELEPHONE MEN OF General Telephone Co. of California were close on the heels of Sia Indian fire fighters, forest rangers, U. S. Marines and Seabees, when a forest fire of overwhelming force originating 9 miles northwest of Santa Barbara, Cal., in early September, plundered through the Santa Ynez Mountains.

Sweeping from the Pacific Ocean north beyond Route 150 and from Gaviota, Cal., east to within 2 miles of the Santa Barbara city limits, the fire encompassed a 113-mile perimeter and burned for 10 days, leaving 77,000 acres of timber and brush blackened and smoldering.

Damage estimated at nearly ten million dollars wiped out 10 homes, countless sheds, barns and other buildings. According to forest officials many deer and thousands of smaller animals were burned to death. The flames also swept through some avocado, lemon, orange and walnut groves. Approximately 225 families were evacuated from their homes during the big fire.

Beginning at 1:30 a.m. on Sept. 6, in a ranch building in Refugio Canyon the fire roared down a steep brush covered mountain side and by the end of 10 days General Telephone Co. estimated damage to its equipment at approximately $25,000.

At the peak of the fire there were 2,100 men on the lines. As rapidly as fire fighters could put out the flames, telephone crewmen began to replace the vital communication system which involved several toll leads, local aerial wire circuits, CAA transmitters, poles and other equipment.

Following the fire's black path, the men provided temporary telephone service to communities in the rugged terrain of Santa Barbara County within a relatively short period of time.

Initially, the fire spread rapidly, burning 35 poles of The Pacific Telephone & Telegraph Co. toll lead as well as several Gaviota toll lead poles, resulting in the loss of service for 26 toll stations and nine farmer line telephones. The restoration of service to the lead was rapid. Service had been

*Mr. Bridges is public relations assistant for General Telephone Co. of California.

disrupted at 2:30 p.m. on Sept. 6, and by the next evening toll station service was restored, with the remaining service partially reinstated by means of duplex by Sept. 9.

Late in the evening of Sept. 7 the Forest Service requested two telephone lines to be established at its camp located in Goleta. However, the fire had spread so rapidly that the camp had to be abandoned before telephone men could complete the installation.

A telephone call from the Santa Barbara sheriff's office during the evening of Sept. 8, indicated that the lead over the San Marcos Road, carrying the Santa Barbara-Santa Ynez toll lead, Goleta local cable 1, and local aerial wire circuits, was endangered by the fire which had reached the ridge at the San Marcos Trout Club. That the hazard was immediate was confirmed by the company engineer, Harry D. Cline, who surveyed the situation first hand. The Santa Barbara testboard alerted the switchmen and supervisors. At 8:10 o'clock that evening the lead was lost. In record time crews established three toll circuits to Santa Ynez, utilizing Pacific Telephone & Telegraph Co. trunks to Santa Maria. The switchman was notified at his home in Santa Ynez by message relayed through the sheriff's office radio car. Fifteen minutes later he had Santa Ynez-Santa Maria trunks in operation thus ending the short period of isolation.

The following day crews were dispatched at 5 a.m. to run temporary duplex along the ground and by Sept. 10, telephone men had 11 of 18 circuits working to Santa Ynez with near normal service, while a section of the San Marcos lead was also being rebuilt.

Fullest assistance was given to the Forest Service to establish telephone service whenever and wherever it was requested. Installers had been called out during the night and early morning hours and immediately dispatched to any location where service was needed. In all, 19 telephones were connected for the Forest Service.

Joe McHale, telephone installer, enroute back from installing a service at Refugio Fire Camp played good samaritan to a herd of cattle trapped by fence and brambles while fire whipped their legs. By cutting the wire fence, he was able to free the bawling cattle from eventual incineration.

Damage to General Telephone Co. facilities had increased with the intensity of the fire and by the sixth day over $18,000 of equipment had been destroyed. Some 47 lines, 241 stations and 18 trunks (toll) were restored to service by the eighth day with a total elapsed time period of 192 hours. At that time 100 poles, 2,310 feet of aerial cable and 2,310 feet of aerial wire had been replaced.

Finally by the morning of Sept. 14, service was considered normal with the exception of six lines and 24 stations including toll service to Santa Ynez still on a limited basis as well as the burned portion of the lead in the Santa Ynez Valley which was being replaced as rapidly as possible.

Telephone officials heaved a sigh of relief while crewmen started work on the replacement of approximately 150,000 feet of duplex which had been installed for temporary toll and local service in the burned area. Restoration of 155 damaged poles had also begun.

Then it happened! A 50-mile an hour wind whipped smoldering embers into flame in the San Jose Creek Canyon on the afternoon of Sept. 14. By evening, trouble was indicated in the Goleta central office and Los Prietos communications were out. The town of Santa Ynez was completely isolated this time, except for one toll line from Santa Barbara.

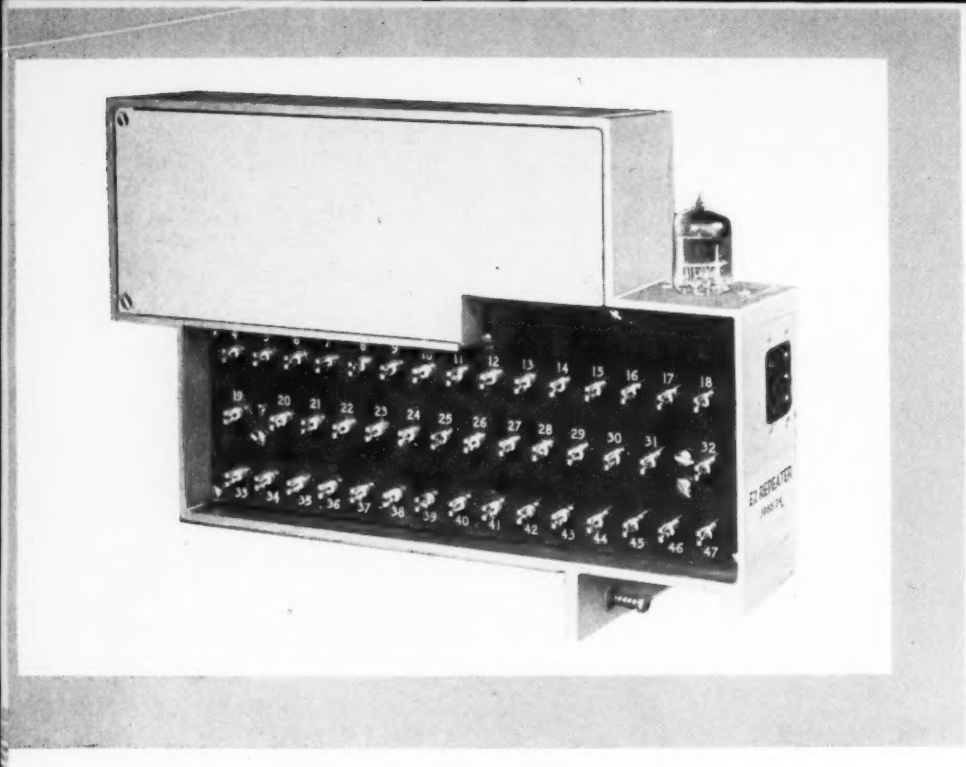
Once again the hard working crews tackled the job of reviving service. With continued effort and efficiency they were able to repair all but 15 lines and 59 stations scattered throughout the burned area by Sept. 16. The fire was declared officially under control and the fire fighters were reduced to a skeleton crew of 300, while the hum of helicopters resounded through the mountains indicating that a close check was being kept on the few remaining acres of smoldering rubble.

The Santa Barbara telephone crews of the General Company, according to W. M. Owen, northern division manager, had come through the fire unscathed despite the threats imposed upon them by the flames. Since safety was stressed at every turn, the office was proud to report that they were fast approaching 1,150 consecutive days of work without lost time due to accident.

Calls during the emergency period showed a tremendous increase in the Santa Barbara office. There was an average of 7,200 long distance calls.

(Please turn to page 38)

"Up She Goes" cries construction foreman, Johnny Dolbeck (second from right) as General Telephone Co. engineer, H. J. Allen (extreme right) looks on. Sturdy crewmen strain to replace a new pole for a pulverized one, near Santa Barbara.



This shows the binding posts used for strapping the gain adjusting network on a series negative impedance repeater. The terminals are strapped according to information obtained from charts which are prepared for different types of line facilities.—Photo courtesy Bell Telephone Laboratories.

Voice Frequency Repeaters

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By HAROLD B. McKAY

PART 5—Grounded Grid Amplifiers

THE SERIES AMPLIFIER arrangement shown in Fig. 4.1 in Part 4 (TELEPHONY, Oct. 1) was actually tried a number of years ago, using the standard repeater equipment of the period. However, later developments have made possible the adaptation of the grounded grid amplifier to the negative resistance principle.

In vacuum tube circuits shown in the first parts of these articles, the circuit of chassis ground was usually at, or electrically near, the cathode of the tube. Actually the ground may be placed on any electrode and the circuit will still function.

Fig. 5.1 shows a single tube amplifier with the cathode grounded. The ground is the negative side of the 130-volt plate battery. The voice voltage which comes in to this circuit from the input transformer is developed between grid and cathode. That is, as the input voltage alternates, the voltage across the grid and cathode alternates. However, because the grid and cathode are at opposite ends of the same coil, they are always opposite in polarity.

The solid arrow represents the direction taken by the incoming voice current, the dotted arrow shows the amplified voice. This is a "standard" amplifier with separate input and output. It could be used as a regular repeater, or as a series or shunt negative impedance repeater as shown in *Fig. 4.1* and *4.2* in part 4.

One thing should be remembered about amplifier operation at this point—that is that the input and output of a tube are always out of phase with

Reprints Will Be Available

This is the fifth of a series of nine articles—six on "Voice Frequency Repeaters" and three on "Power Supplies for Repeaters and Carriers."

The author, Mr. McKay, will be remembered for his three series of popular articles on "Principles of Microwave Operation"; "Electrical Principles Used in Carrier Systems"; and "Corrosion of Underground Cables" and other articles published in TELEPHONY.

These repeater articles will be invaluable as employe training material and if firm orders are received for a sufficient number of reprints (in booklet form) to justify reprinting, they will be available following publication of the nine articles.

Telephone companies desiring reprints are asked to enter their reprint orders during publication of the articles. Prices of the booklet form of reprint are as follows:

1- 100 copies	each	$.85
101- 200 copies	each	.80
201- 300 copies	each	.75
301- 400 copies	each	.70
401- 500 copies	each	.65
501-1,000 copies	each	.60
Over 1,000 copies	each	.50

each other. This is because the grid *voltage* controls the plate *current* as follows: Normally, the grid is slightly negative. If this negative grid voltage is increased, the plate current is reduced. If the grid voltage is reduced, the plate current rises. Thus, the plate current acts just opposite to the grid voltage. Hence, the plate is opposite in phase to the grid.

Now consider *Fig. 5.2* which is a grounded grid amplifier. The input transformer voltage appears across the grid and cathode just as in the amplifier in *Fig. 5.1*, thus, the input voice voltage circuit would be the same. However, because of the new circuit arrangement, the current in the plate circuit, in order to complete back to the cathode, must go through the same input transformer as does the incoming voice.

The solid arrow shows the direction of the incoming voice voltage at any one instant, and the dotted arrow shows the amplified output voice current. In this amplifier, only the one transformer is used, and it is both input and output.

The incoming voice voltage and the amplified voice voltage are of opposite polarity, because of changes in going through the tube. This condition exists in both primary and secondary of the transformer, and, therefore, also on the telephone line. Incidentally, this condition defines itself as negative resistance right at this point—the applied voice voltage upon entering the negative resistance amplifier gives rise to a current in the opposite direction. This is one of the definitions of negative resistance.

Opposite direction

This plate current of opposite direction, when it is transformed back into the primary and the telephone line, is now of the proper polarity to add in series with the voltage from the telephone transmitter and, hence, cause more voice current to flow on the line

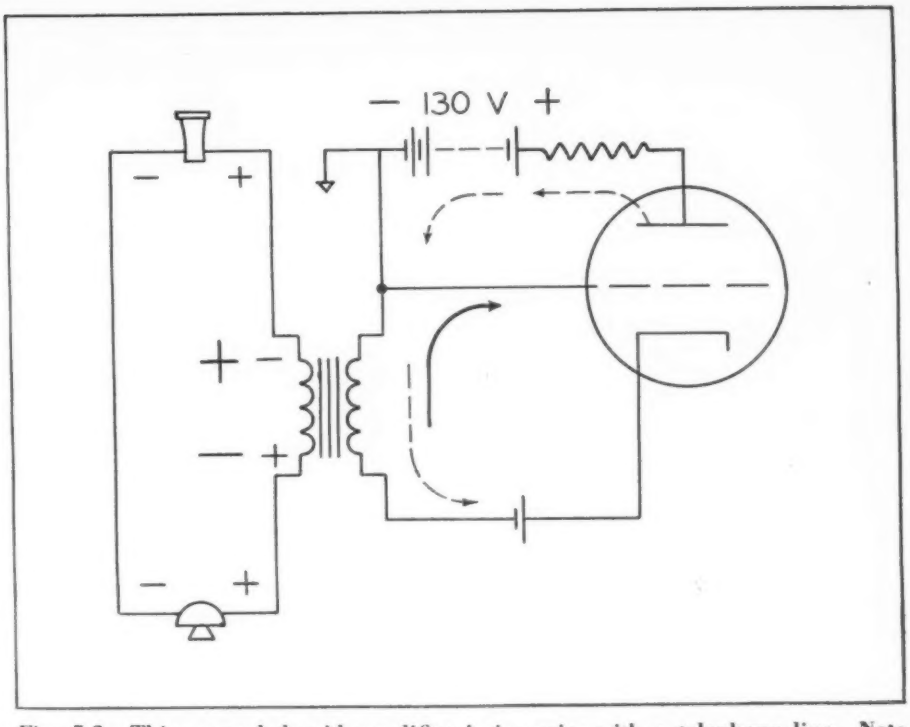

Fig. 5.2. This grounded grid amplifier is in series with a telephone line. Note that the input (solid arrow) is still impressed across the grid and cathode as in Fig. 5.1. The output (dotted arrows) still goes from the plate to the cathode. The output, however, goes through the same coil in the transformer as does the input. Furthermore, it goes through this coil in the opposite direction. The small *plus* and *minus* signs in the telephone circuit represent the original transmitter polarity at any given instant. The large signs are the amplified voltage put out by the tube. This is in series aiding with the transmitter, thus increases the current flow on the line. This is the principle of negative resistance.

which is what is wanted. This is shown in *Fig. 5.2*. The light *plus* and *minus* signs are the original voice. The heavy signs are the amplified voice.

Our drawing shows currents going in both directions through the transformer secondary, which is obviously a contradiction which calls for further analysis. First of all, remember that the original voice voltage in the transformer comes in from the line. Therefore, as far as the amplifier, itself, is concerned, the source of this voltage is the transformer.

The amplified plate voltage, however, comes from the tube. The tube and the transformer are in series, so, therefore, as in the case of batteries, the poles are opposite so that one adds to the other. However, even in a string of batteries, if one cell is weak or much smaller than the others, the stronger batteries will tend to overpower the weaker, even to the extent of reversing its polarity. (You may have had this experience when a poor cell in your car battery reversed its polarity.)

In *Fig. 5.2*, the plate power is stronger than the incoming power, because it is amplified. Therefore, it tends to overcome the incoming voice and diminish the incoming voltage. Thus, two seemingly contrary things happen at once—the voltage and current *on the line* is raised by the series aiding effect of the amplifier, but the incoming voltage *within the amplifier* is reduced.

Negative Feed-Back

The latter effect constitutes "negative feed-back" and is one of the advantages of this type of circuit. Negative feed-back means that the output of the amplifier limits the amount of current being fed in. Therefore, it sort of regulates its own volume. Because any distortion which would be created by the amplifier would be present in the output but not the input circuit,

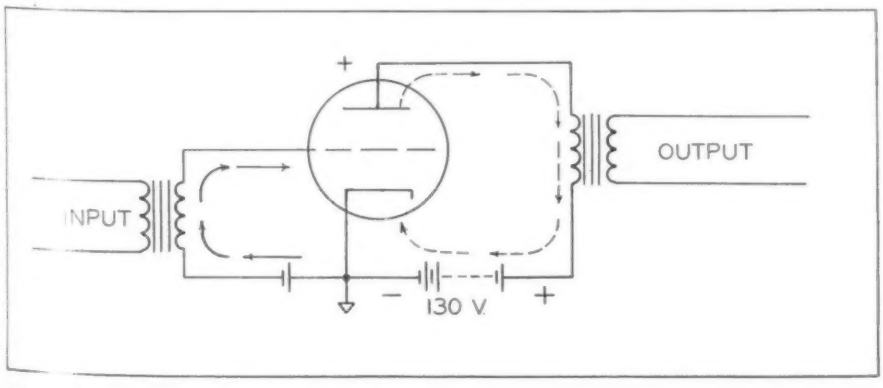

Fig. 5.3. The input (solid arrows) is a separate circuit from the output (dotted arrows) of this grounded cathode amplifier. While the cathode is common to both circuits, each goes its separate way. Compare with Fig. 5.2. (Drawings in this article are by Victor Willard.)

negative feed-back permits it to be fed back purposely into the input.

Because this feeding-back is "negative" or out-of-phase, the distortion which appears in the output circuit is, therefore, cancelled out in the input. Thus, better fidelity is achieved with negative feed-back. However, negative feed-back, for all of its advantages, does reduce the amount of output power available, because of the fact that the input and output work against each other in the transformer, as shown above.

Therefore, in repeaters of this type a certain amount of positive feed-back is also used in order to get enough amplification for the line. Positive feed-back is the opposite of negative. While the negative kind causes the output to cancel out some of the input, the positive variety causes the output to aid the input. Where in negative feed-back, the voltage fed back is out of phase with the input, in positive feed-back the voltage of input and output are in phase. Positive feed-back is a regeneration process, negative is degenerative.

Fig. 5.3 shows a more complete schematic of a negative impedance repeater. This uses a double tube, which is composed of two complete tube units. Note, also, that in actual practice the repeater is connected to both sides of the telephone line, instead of only one as shown previously. This circuit will be recognized by radio men as having the basic elements of a "push-pull" circuit.

Fig. 5.3 also shows a balancing network, which we will discuss later. At this time notice the two condensers C3 and C4 which connect the plate of one tube to grid of the other. This is the "positive-feed-back" feature.

To understand the operation of this, remember that the plate circuit of a vacuum tube is of opposite phase to the grid of the same tube. Notice that in the two tubes shown here, one is hooked to each side of the input transformer. Therefore, the input circuit of one tube is out of phase with the other. That is, the two grids are opposite in phase—one would be positive when the other was negative.

At any one instant, if grid 1 is positive, then the amplified voice in the plate circuit will be negative. If this negative voice is coupled to grid 2 through the condenser, it finds that grid 2 is already negative (because it is at the other end of the input transformer). Therefore, this voltage is in phase. This is the opposite effect to the cancelling out, which occurred in the input transformer as explained earlier.

This coupling back of the voice currents in phase actually results in greater amplification, and is, therefore, called positive feed-back. The total amplification achieved by this type of a repeater is the result of the tug-of-war between the positive and negative feed-back. Of course, the positive is greater than the negative, which is why amplification results.

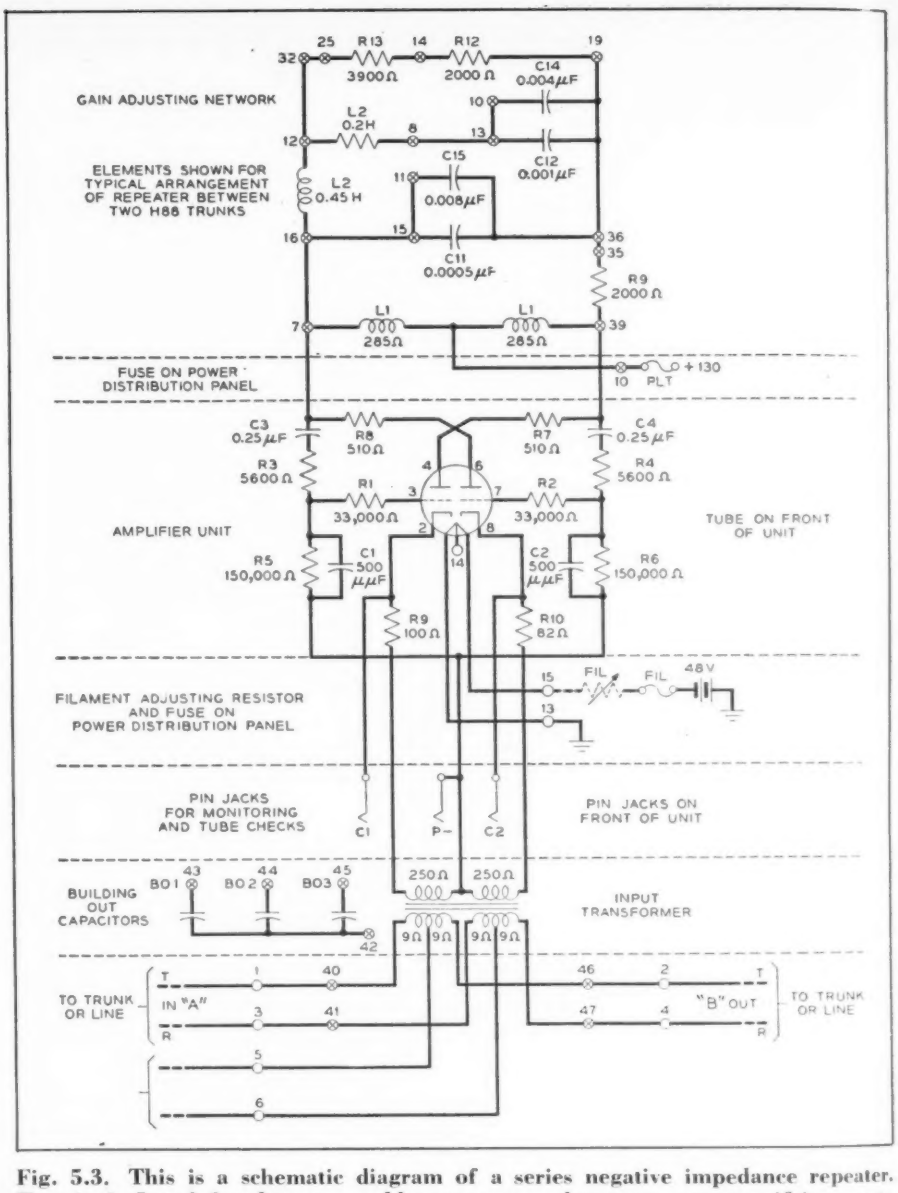

Fig. 5.3. This is a schematic diagram of a series negative impedance repeater. Terminals 5 and 6 at bottom would connect to a shunt type repeater if it were to be used.—Courtesy Bell System Technical Journal.

The amount of positive feed-back achieved with the coupling condensers is modified by the gain adjusting network, which is shown in *Fig. 5.3*.

The Network

The need for the network will be seen when it is remembered that any cable pair, or other transmission line, transmits some frequencies better than others. Many factors govern the way a transmission line will respond. These include such things as the type of termination for the line, the different gauges of wire which might be used, the loading coils, if any, the shielding, and the insulation.

If a number of different frequencies were sent over a line, and the received power measured, the result could be plotted on a graph chart and would show the characteristics of that particular line. For standard cables and loading plans, these curves are already known.

If a regular amplifier is connected to such a line, it will amplify everything it receives without particular discrimination. Therefore, if the line causes some frequencies to transmit better or worse than others, this distortion will be amplified and sent on. It is desirable to correct this, because otherwise the received voice will sound different from that which is sent.

Another factor is that of band-width. Normally, the human voice contains

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General and Gary Shareholders Approve Merger Plan

THE SHAREHOLDERS of General Telephone Corp. and Theodore Gary & Co. on Sept. 29 approved the plan of merger whereby Theodore Gary & Co. will be merged into General Telephone Corp. Action was taken at special shareholders' meetings of both companies held in New York and Kansas City following the recommendations made by the boards of directors in August 1955.

Participating common and common shareholders of Theodore Gary & Co. will receive 1½ shares of General Telephone Corp.'s common stock for each of their shares under terms of the merger. The effective date for merging the two companies will be Oct. 31, 1955.

Donald C. Power, president of General Telephone Corp., who will continue as president and chief executive officer of the surviving General Telephone Corp., stated that it is anticipated the combination of these properties will result in a better integrated and more efficient telephone operating system. The telephone subsidiaries of Gary operate in 17 states in the United States and their properties in eight states in which General Telephone's subsidiaries also operate are conveniently located for efficient integration. General Telephone presently operates in 21 states.

The merger will also result in the addition to General Telephone System of substantially larger manufacturing and selling activities, principally the Automatic Electric Co., which is the largest manufacturer of telephone equipment in the United States outside of the Bell Telephone System's Western Electric subsidiary. Additional manufacturing units are located in Brockville, Ontario; Milan, Italy, and Antwerp, Belgium.

Based upon current operations, the enlarged General Telephone Corp. will receive approximately 61 per cent of its revenues from telephone operations and 39 per cent from manufacturing sources. It will have approximately 2½ million telephones in service (out of a total of 54 million in the United States) and will employ more than 40,000 people. Total investment will be in excess of 700 million dollars and should exceed one billion dollars within the very near future, according to Mr. Power.

REA Assigns $4,129,000 in Loan Funds To Borrowers in Eight States

DURING the period Sept. 16 through Sept. 24, the Rural Electrification Administration made 11 telephone loans amounting to $4,129,000 for improving and extending telephone service in rural areas of Colorado, Louisiana, Missouri, Minnesota, Oklahoma, Florida, New York and Wyoming. Details of loans announced on Sept. 28 by the U. S. Department of Agriculture are:

*

Green Hills Telephone Corp., Breckenridge, Mo., on Sept. 19 was authorized to borrow $389,000. This loan, the second to this borrower, supersedes and replaces a $35,000 supplemental loan approved on Feb. 25, 1954.

With these funds the Green Hills mutual proposes to expand its operating territory in Caldwell and Ray counties. As a nucleus for this extended service, the corporation proposes to acquire the Cowgill Telephone Co. and the Breckenridge Telephone Co. These facilities are now serving 503 subscribers.

The borrower plans to construct new automatic offices at Cowgill and Breckenridge, and at Knoxville which now has no telephone service. Of the 95 miles of acquired line, 5 miles will be retired and 90 miles rebuilt. In addition, the borrower plans to add 150 miles of new line.

These changes will make it possible for the Green Hills corporation to offer improved service to the existing subscribers and initial service to 288 families and other rural residents now without telephones in the proposed expanded area of the Green Hills system.

Funds are also provided in the loan to construct 5 miles of new line and other facilities to serve an additional 51 subscribers in the present operating area of the system.

With the two REA loans, totaling $642,000, the borrower will be able to offer new and improved service to 1,357 subscribers in Carroll, Caldwell, Daviess, Livingston and Ray counties. The system will consist of 433 miles of line and seven exchanges. The Dawn, Lock Springs, Ludlow and Mooresville exchanges are in operation.

Charles W. Weldon is president and Travis W. Harper is manager of the Green Hills Telephone Corp.

*

Sept. 20 was the date the Clear Valley Telephone Co., Clearwater, Minn., was authorized to borrow $159,000, its first REA loan, to improve and extend rural telephone service in Sherburne, Stearns and Wright counties.

The Clear Valley company, a new borrower, now furnishes dial and magneto service to 201 rural subscribers, over 50 miles of line. It plans to convert the system entirely to automatic operation, and add facilities to serve 147 rural families now without telephones.

Of the existing line, 22 miles will be used in the expanded system, 9 miles retired and 19 miles rebuilt. The borrower proposes to add 66 miles of new line and construct a new automatic central office at Clear Lake to serve the area. The completed system will consist of 107 miles of line. Gerald R. Dickson is president and manager of the Clear Valley company.

*

Southwest Oklahoma Telephone Co., Duke, Okla., on Sept. 20 was allocated $163,000 to improve and extend rural telephone service in Greer, Harmon and Jackson counties.

The company, a new borrower, plans to use these funds to furnish modern dial service to 343 rural subscribers in its service area. Of the existing 35 miles of pole line, 10 miles will be used in the expanded system, 19 miles will be rebuilt and 6 miles retired. The borrower plans to add 118 miles of new line, and to construct a new automatic central office building in Duke.

The rehabilitation and new facilities added will make it possible for the borrower to improve service for 166 existing subscribers in its operating area and to serve 177 rural families now without telephones.

W. T. Green is president and manager of the Southwest Oklahoma Telephone Co.

*

Tri-County Telephone Co., Bonifay,

(Please turn to page 50)

Water Vapor Permeability Through Thermoplastic Cable Jackets

By ANDREW D. VARENELLI*

THE USE of thermoplastics to jacket multi-conductor cables has given rise to differing opinions on whether polyvinyl chloride or polyethylene were the better jacket material. Leaving aside the question of differing weathering and abrasive qualities, much has been made of the differing rate of water vapor permeability between the two materials. Little if anything has been done, however, to determine what effect this difference in permeability had on the cable in actual service. It has been found that there is no practical difference in the operation of cable made with either jacket material.

The standard tests for water vapor permeability show a substantial lower rate of permeability for polyethylene as compared with vinyl. (See *Table I.)* Upon examination, however, it is found that the standard tests do not relate to the situation that obtains in a cable. These tests are made by placing a dessicant on one side of the jacket and water or water vapor on the other. As fast as the moisture passes through the jacket the dessicant absorbs the moisture and no determination is possible of a counterbalancing vapor pressure on the side opposite the water. In a cable in use, the inside, or core, of the cable does not have a means for constant removal of moisture. The cable core must attain the vapor pressure that given atmospheric conditions and jacket permeability make possible. The inner vapor pressure must eventually balance the outer vapor pressure and a varying but nevertheless definite equilibrium established.

A simple practical test was devised to show that such an equilibrium occurs. The fact that the amount of moisture absorbed by paper is related to the humidity of the surrounding atmosphere was the basis for the method used to determine the change in the humidity of the cable core. (See *Fig. 1.)* Three different cables were used for the determination. The first cable was 101-pair telephone cable jacketed with 75 mils of plasticized polyvinyl chloride with two kraft paper tapes in the core. The second cable was a 26-pair telephone cable having a 60-mil sheath of polyethylene and one kraft paper tape in the core. The third cable was a 51-pair telephone cable with a 60-mil jacket of plasticized polyvinyl chloride and two kraft paper tapes in the core.

The cables were cut into 2-foot lengths and the ends were sealed with a self-bonding polyethylene tape which was then covered with an adhesive backed vinyl tape. The samples were marked as they were cut so that the moisture content of the paper in the immersed cable and the cable main-

*Mr. Varenelli is chief chemist of The Ansonia Wire & Cable Co. of Ansonia, Conn.

WATER VAPOR PERMEABILITY OF TYPICAL JACKET STOCKS

Grams/100 Sq. In./24 Hours

	Vinyl Jacket Type A	*Vinyl Jacket Type B*	*Vinyl Jacket Type C*	*Vinyl Jacket Type D*	*Vinyl Jacket Type E*	*Neoprene Jacket*	*Polyethylene Jacket*
Thickness, Inches	0.055	0.060	0.050	0.065	0.050	0.055	0.060
M.V.T @ 68 Hours	0.1223	0.5057	0.3965	0.1816	0.9802	0.0989	0.0108
M.V.T. @ 1 Week	0.1259	0.5127	0.4055	0.1868	0.9830	0.1355	0.0082
M.V.T. @ 2 Weeks	0.1216	0.5162	0.4080	0.1920	0.7300	0.1034	0.0052

(1) Tests were made by B. F. Goodrich Chemical Co., using T.A.P.P.I. 464m-45 method.
(2) Weight changes were measured at 68 hours, 1 week, and 2 weeks.
(3) Vinyl jacket Type A—80°C rating—Monomeric plasticizer.
Vinyl jacket Type B—60°C rating—Low temperature.
Vinyl jacket Type C—105°C rating—Polymeric plasticizer.
Vinyl jacket Type D—60°C rating—Phthalate plasticizer.
Vinyl jacket Type E—60°C rating—Extremely low temperature.

Table I

tained in the room would be of adjacent pieces of cables. One-half of the samples were maintained at room conditions. Some of the remaining samples were immersed in water and some of the specimens were maintained at 90 per cent relative humidity. In each instance the cables were bent into a "U" and positioned so that the taped ends were not immersed.

The humidity chamber was an air-tight box with a tight lid through which holes were bored to accommodate the cable ends. After the cable ends were pulled through the lid, the space between the hole in the lid and cable jacket was made air tight by sealing with a microcrystaline wax. Constant humidity of approximately 90 per cent was maintained in the box by using a saturated solution of zinc sulfate with an excess of definite solid phase.

After various intervals of time, the paper tape was removed from the immersed cables and the adjacent pieces of cable maintained at room conditions. The paper was removed as quickly as possible, placed into weighed weighing bottles and the moisture content determined.

The change in the moisture content of the paper was used as a basis to indicate the change in humidity in the core of the cable.

The results shown in *Table II* and *Fig. 2* and *3* indicate that when a cable jacketed with plasticized polyvinyl chloride is immersed in water, the humidity in the core of the cable reaches equilibrium in one to four months. When a cable jacketed with polyethylene is maintained at constant humidity by being immersed in water, the humidity in the core of the cable reaches equilibrium in six to 10 months. Also, when a cable jacketed with plasticized polyvinyl chloride is maintained at 90 per cent humidity, the core of the cable reaches equilibrium in four to nine months.

The amount of moisture in the paper of the cables at equilibrium varied somewhat. This variance could be because the amount of moisture pick-up of paper will vary with the composition and physical characteristics of the paper.

Table II

PER CENT MOISTURE IN PAPER* (CABLES IMMERSED)

Cable Specimen	51-Pair No. 22 60-Mil PVC Jacket 2 Paper Tapes	101-Pair No. 19 75-Mil PVC Jacket 2 Paper Tapes	26-Pair No. 22 60-Mil Poly. Jacket 1 Paper Tape	51-Pair No. 22 60-Mil PVC Jacket 2 Paper Tapes
Medium	Water	Water	Water	50% Relative Humidity
TIME				
1 Mo.	11.0	7.0	6.4	5.8
2 Mo.	11.8		6.2	
4 Mo.	11.4	9.5		7.5
5 Mo.	11.5	9.2		
6 Mo.			6.9	
7 Mo.		11.5		
9 Mo.		11.1		9.3
10 Mo.	13.2		8.4	8.4
11 Mo.	11.5		8.3	
12 Mo.	10.2	9.1	8.5	
16 Mo.				9.1
17 Mo.		10.4	7.6	
18 Mo.	12.2			

*—Per cent of wet weight of paper.

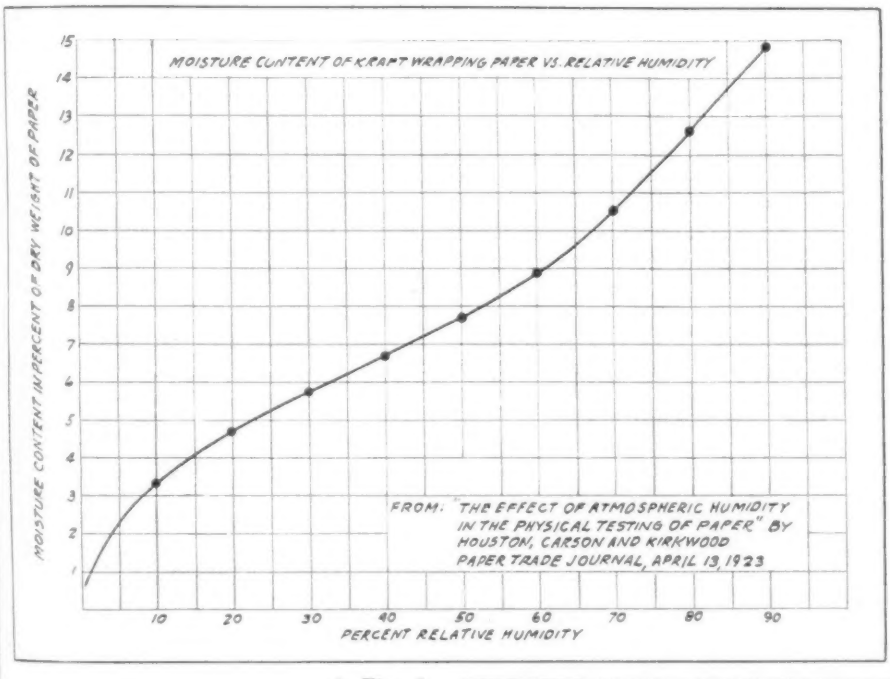

MOISTURE CONTENT OF KRAFT WRAPPING PAPER VS. RELATIVE HUMIDITY
MOISTURE CONTENT IN PERCENT OF DRY WEIGHT OF PAPER
PERCENT RELATIVE HUMIDITY
FROM: "THE EFFECT OF ATMOSPHERIC HUMIDITY IN THE PHYSICAL TESTING OF PAPER" BY HOUSTON, CARSON AND KIRKWOOD PAPER TRADE JOURNAL, APRIL 13, 1923

Fig. 1

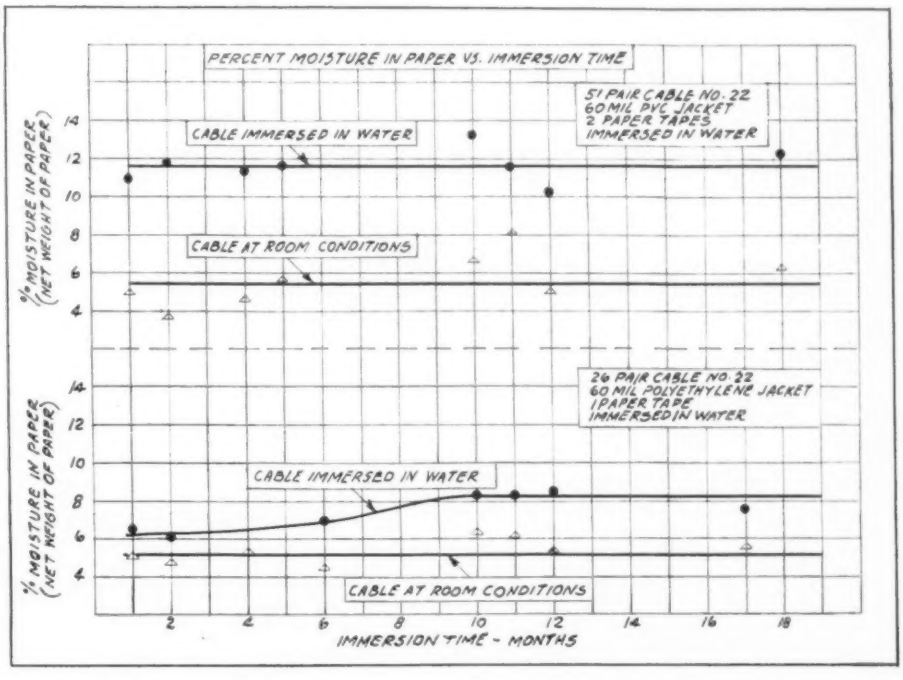

PERCENT MOISTURE IN PAPER VS. IMMERSION TIME
51 PAIR CABLE NO. 22 60 MIL PVC JACKET 2 PAPER TAPES IMMERSED IN WATER
CABLE IMMERSED IN WATER
CABLE AT ROOM CONDITIONS
26 PAIR CABLE NO. 22 60 MIL POLYETHYLENE JACKET 1 PAPER TAPE IMMERSED IN WATER
CABLE IMMERSED IN WATER
CABLE AT ROOM CONDITIONS
% MOISTURE IN PAPER (NET WEIGHT OF PAPER)
IMMERSION TIME - MONTHS

Fig. 2

Summary

The data obtained on the specimens of cable tested indicate that the water vapor pressure inside a cable jacketed with plasticized polyvinyl chloride or polyethylene is dependent upon the

(Please turn to page 38)

Automatic's research in reception problems bring you this **SPECIAL**

Transistorized Type 80 Monophone

Provides "normal" reception to hard-of-hearing subscribers, even those unable to use a standard telephone. Compact transistor amplifier within telephone housing boosts incoming speech up to 16 times. An inconspicuous knob behind the cradle controls volume. New customers, more satisfied customers, and more revenue await the company that furnishes transistorized Type 80's.

Transistorized Operator's Headset

Amplifies up to 16 times—enables operator to hear very weak signals. Transistor amplifier measures only 2½"x1⅜"x3", is housed with plug to keep headset light in weight. Amplifier starts work when plug is jacked in; draws current from the circuit, needs no other power. Volume control permits operator to adjust gain to most comfortable level.

NEW HELPFUL GUIDE NOW READY! Gives technical facts plus ordering information on all special equipment shown here. Offers valuable tips on which of these tested, proved items will best meet each of your problems. Complete information in new circular T1823, now available. Address: Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7. Or call HAymarket 1-4300.

roup of Automatic's research scientists
ises application of a new transistor-equipped
duct, still in the "breadboard" stage.

A transistorized telephone that "speaks up" for the hard-of-hearing— a transistorized operator's headset to compensate for reception difficulties: Automatic's rapidly-growing special-purpose equipment line provides better service, builds good will and revenue.

RPOSE EQUIPMENT

AUTOMATIC ELECTRIC

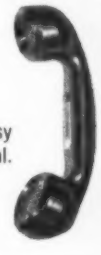
RIGINATORS OF THE AUTOMATIC DIAL TELEPHONE

AUTOMATIC OFFERS A FULL LINE OF SPECIAL-PURPOSE EQUIPMENT TO MEET DIFFICULT RECEPTION CONDITIONS.

ROANWELL "CONFIDENCER"

Most economical device you can buy for noisy locations. Fits Type 41 handset (used with Types 40, 43, 47, and 50 Monophones). Contains special sound chambers that neutralize room noise. Slope of mouthpiece brings user's lips closer to insure maximum effect of voice on transmitter.

TYPE 25 HANDSET FOR MODERATELY NOISY LOCATIONS



Inexpensive, yet effective. Ideal for noisy sites where enclosed booths are not practical. Caller presses button on handset to cut out transmitter when listening, releases button to talk.

TYPE 27-A HANDSET FOR THE HARD-OF-HEARING

A touch of the button on the handset boosts reception to 12 db above normal - - a level which has proved very satisfactory to the average hard-of-hearing subscriber. Button can be locked at high-gain position.

TYPE 27-B HANDSET FOR EXTREMELY NOISY LOCATIONS

Receiver amplifies sound to 12 db above normal when caller presses button. Cup-shaped mouthpiece catches caller's voice while excluding surrounding noises.

TYPE 38 SPECIAL ANTI-NOISE HANDSET

For locations where high-pitched whining sounds are prevalent, such as in power stations, or in rooms housing oil burners or diesel engines. Special mouthpiece and damped diaphragm transmitter cut off a maximum amount of noise.

humidity of the surrounding atmosphere.

Although the established rate of water vapor permeability through plasticized polyvinyl chloride is much higher than the rate through polyethylene, the time required for the water vapor pressure in the core of the cable jacketed with polyethylene to reach equilibrium was not substantially longer.

The tests performed also show that using polythylene as a cable sheath instead of plasticized polyvinyl chloride, does not prevent moisture entering the core of the cable.

Furthermore, the accumulated data substantiates our past findings that the amount of moisture present in the cores of cable after the water vapor pressure equilibrium has been established, will not effect the intended service operation of a cable made with polyethylene insulated conductors, and jacketed with either plasticized polyvinyl chloride or polyethylene.

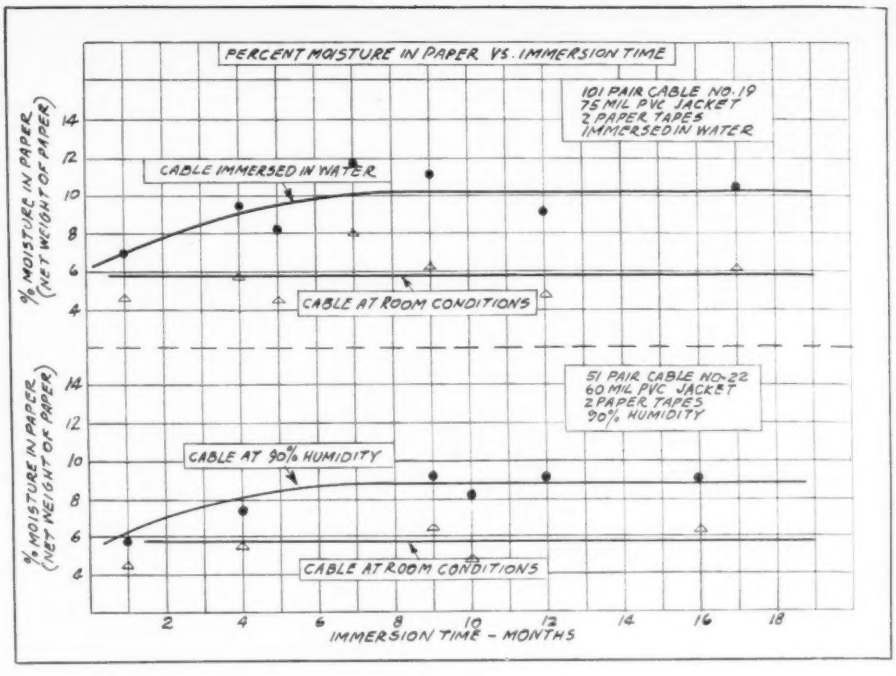

PERCENT MOISTURE IN PAPER VS. IMMERSION TIME
101 PAIR CABLE NO. 19
75 MIL PVC JACKET
2 PAPER TAPES
IMMERSED IN WATER
CABLE IMMERSED IN WATER
CABLE AT ROOM CONDITIONS
% MOISTURE IN PAPER (NET WEIGHT OF PAPER)
51 PAIR CABLE NO. 22
60 MIL PVC JACKET
2 PAPER TAPES
90% HUMIDITY
CABLE AT 90% HUMIDITY
CABLE AT ROOM CONDITIONS
IMMERSION TIME - MONTHS

Fig. 3

IN THE NATION'S CAPITAL

Concluded from page 24

Whatever they may think of the individual umpire, all ballplayers realize that the institution of umpiring is entitled to respect and that it is essential to the security of organized baseball.

So it is in this spirit that I suggest that utilities, in the interest of good public relations for regulation, should respect these commissioners and what they stand for. We all know that they are getting more and more responsibilities piled upon them all the time by court decisions. . . .

These matters are directly involved in public relations of regulation because public utility regulation will never reach its full potential of fairness and effectiveness until it applies to all utilities alike, public as well as privately owned, without fear or favor. Only then will the consuming public, in its entirety, have the full protection it ought to have. Only then will the investors have the full measure of protection they deserve, because only then will all utilities be playing the game according to the same rules and the same laws.

The ground is all prepared. The people are waiting for the right message. They as well as their congressmen, basically, have complete confidence in the private enterprise system for our utility services, regardless of surface appearances to the contrary. I venture to say, that if we could conscientiously poll every member of Congress and ask him point blank if he were in favor of turning over our electric or other utility services to political operation, we would not get more than two or three senators, or five or six representatives, who would say "Yes."

Why? Because they know, underneath all the political cat slinging, and logrolling, and pork barreling, that the American people are getting the best bargain they ever had or ever could have in their utility services. But they and the public need assurance, clarification, straightening out, not once but constantly. I know of no better way to do that than to tell the story of regulation over and over. It is just as simple and as difficult as that.

NEW DEVELOPMENTS

Concluded from page 27

weighs 6¾ pounds, permitting it to be used in close quarters. The forward positioning of the pistol-grip handle provides excellent balance, easy maneuverability and affords complete control when making cuts in any direction. With this saw, all 360 degree cuts can be made without changing hand positioning.

Strict adherence to "in-line" design permits the operator to make clean cuts to close tolerances. Edge dressing is unnecessary as the reciprocating action (2,500 strokes per minute) provides a burr-free edge.

A $\frac{9}{16}$ inch diameter shaft and extra-heavy construction throughout adapts this new tool to jobs formerly beyond the capacity of portable tools of this type. Three ball bearings in the drive and crank mechanism assure smooth operation and long life, and this mechanism is sealed in a special lubricant which protects all moving parts. *(See Fig. 21.)*

(To be continued. In the second installment it was stated that this series would be in three parts, but it was found necessary to run the third part in two issues, thus making a four-part series.)

KEEP THE LINES WORKING

Concluded from page 29

This compared with from 5,200 to 5,500 calls on a normal working day. Operator crews were working full force until 10 p.m. Despite the heavy traffic, coupled with emergency calls from crewmen working in the field, the cool headed and conscientious women in front of the switchboards provided rapid and efficient telephone service. Fire control officer, Nolan O'Neal and forestry supervisor, Robert S. Jones of the U. S. Department of Agriculture, complimented Santa Barbara operators for holding back their temper, when on many occasions they were inflicted with tongue lashings from tense and impatient fire fighters. Mr. O'Neal remarked, "We asked the impossible and got it!"

"Keep the Lines Working," became the watchword of every telephone man in the Santa Barbara telephone organization during this crisis. In the highest traditions of the telephone business another chapter was added to the courageous story where a few telephone men and women working together maintained service vital to so many.

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITOR

TELEPHONE station installers have always been noted for being neat workmen. They always clean up after working in a house and this certainly contributes a great deal towards good public relations.

A few little stunts can make the cleanup job much easier and quicker. For example, when it is necessary to bore a hole through a plaster wall, the dust may scatter over a large area much to the disgust of the lady of the house. This is especially true if the hole must be bored near the ceiling.

This difficulty can be avoided by taking a length of masking or cellophane tape and fastening a paper drinking cup directly below the spot where the hole is to be drilled. The hole may be drilled through the tape to prevent cracking and breaking plaster and the cup will catch all cuttings from the drill for easy disposal.

•

Some time ago, the weather number in the nation's capital was changed from WEather 3-1212 to WEather 6-1212. During the Hurricane "Connie" scare, special weather information on the hurricane could be obtained by dialing the old weather number. Business was good though for the telephone company and seldom could you get anything except a "busy" when you dialed either weather number.

•

"'Way back in the fall of 1923, there was a young fellow who thought he knew all there was to know about radio and telephony. So he enlisted in what was then known as the 19th Signal Service Company, U. S. Army, with station at Omaha, Neb. He was assigned sleeping quarters over the radio transmitting station 'up on the hill.'

"One night it rained and a window was left open back of the transmitter and everything got soaked. Next morning when the operator down in the Post hit the remote key, 'boom' went the high voltage generator.

"This young man, being a green recruit, took the blame for two other fellows who were in charge of the station. And this young recruit darn near got the guard house.

"If it had not been that there was a Signal Corps civilian engineer there at that time, he would have, too.

"But this engineer smoothed out the colonel's feathers, had the generator rewound, and saved the kid.

"That kid was me. And the engineer well, his name was Ray Blain."

So reads a letter recently received from F. M. Farwell, plant superintendent of the Cuming County Telephone Co. of Wisner, Neb.

We remember well when he was a recruit in the Signal Corps back in 1923. Actually, he did not think that he knew it all either at that time, and even then he was a well-qualified communicator. It was a pleasure to hear from him and to learn that he is still a member of the fraternity.

•

We thought we had seen just about everything in vending machines and then up in New York City the other day in the air terminal we saw something new.

"Yeah, but supposing the belt breaks."

This was an electric razor in a sterilized case with a glass door. Drop a quarter in the slot and the door could be opened, and the razor taken out for a quick shave.

•

Voice recorders can be utilized to good advantage by field men on construction projects. We have personal knowledge of one large construction job in Alaska on which recorders have been used in such a manner as to permit large savings in both time and money.

When men are out on a job, they seldom have the time, inclination, or means to write lengthy reports concerning their work. A recorder makes these reports easy and all items are covered in understandable detail which would not be possible in a written report. The small plastic records are mailed back to the home office without difficulty.

Battery-operated recorders are provided for use in locations where commercial power is not available.

•

Complete telephone service for one year is being included in the purchase price of model homes by a Cincinnati builder. Five instruments are provided in some of the houses, four in others. All telephones are in color except black wall sets for unfinished basements.

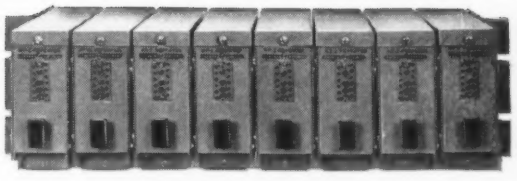
The progressive home builder of the future undoubtedly can increase sales by such special features. Home buyers are already taking for granted such features as built-in dishwashers and garbage disposers. Kitchen stoves, refrigerators, freezers and automatic washers are being furnished in some areas. Prepaid, well-located color telephones may provide the unusual extra to increase the salability of a house.

ECONOMICAL, UNIT-BY-UNIT EXPANSION of voice frequency repeater facilities is one of the big advantages of Type AT-2. The convenient, plug-in unit shown is a *complete repeater*. It can be removed without interrupting conversation.

New TRANSISTORIZED Repeater

Little larger than your hand!

Automatic's New Type AT-2 Voice-Frequency Repeater provides striking advantages; up to 10 db gain—only one watt power drain—small size—simple installation, and almost no maintenance.



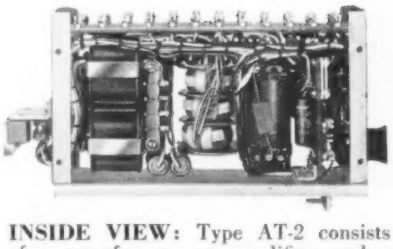
EIGHT COMPLETE REPEATERS mount on a 19″ rack, or 10 on a 23″ rack. Special fins on transistors eliminate need for cooling fans, regardless of number of repeaters in installation.

Saves Space
Using transistors as small as a pencil eraser, instead of bulky tubes. Type AT-2 measures only 5¼″ high, 2″ wide, and 7½″ long.

Saves Maintenance
Transistors last many times longer than vacuum tubes, and are almost free from aging and dissipation. You can forget tube failures, forget frequent checks of output levels.

Saves Power
Type AT-2 is fully self-contained; it needs no power supply other than your exchange battery. Draws only about 1/10th the power required for comparable vacuum tube units.

Offers Simple Installation
Your own employees can install Automatic's Type AT-2 Voice Frequency Repeater. No electronic training necessary. A specially-designed Installer's Set is available for quick matching of network to line.



INSIDE VIEW: Type AT-2 consists of a transformer, an amplifier, and a balancing network. Operates on the principle of combined negative and positive feedback voltages. Works best at or near midpoint of line.

Has Many Applications
Maximum gain is about 10 db on non-loaded cable or open wire, and from 6 to 8 db on loaded cable or wire. You can use Type AT-2 to raise transmission to toll grade, or to permit use of smaller-gauge cable on inter-office trunks, long subscriber lines, foreign exchange lines, P-B-X tie trunks, tandem and tributary trunks, centralized intercept and information trunks, loaded and non-loaded cable, and other applications.

Get Full Information Today!
Fully-tested Type AT-2 offers substantial savings you cannot overlook. Write today for new Circular 1844 which gives complete details and handy ordering data. Address: *Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7. Or call HAymarket 1-4300.*

OVER 60 YEARS SERVICE TO THE INDEPENDENT TELEPHONE INDUSTRY

AUTOMATIC ELECTRIC

ORIGINATORS OF THE AUTOMATIC DIAL TELEPHONE

Courts and Commissions

Gains Permission to Buy Five Exchanges in Kansas

Harper County Rural Telephone Co., Anthony, obtained authority from the Kansas Corporation Commission Sept. 21 to purchase five exchanges in Harper and Sumner counties and convert them to automatic operation (TELEPHONY, Aug. 20, p. 33).

The exchanges to be acquired are at Corbin, Perth, Freeport, South Haven and Waldron.

Upon consolidation of the companies and conversion to dial service with the help of a $65,000 REA loan, the new company will operate from exchanges at Corbin, South Haven, Freeport and Waldron.

Company officials testified at a recent hearing that the present exchanges serve 486 customers, but that the conversion will give the new company a potential of 814 customers.

SAGE Contract Controversy Subject of PUR Comment

Recent attacks on the legality of certain Air Force contracts with private telephone companies to tie together a continental defense communications network (known as SAGE—for Semi-Automatic Ground Environment), brought forth the following comment (including the stands taken by some REA co-op officers) in *P. U. R. (Public Utilities Reports) Executive Information Service* (letter of Sept. 30):

"Officers of some REA telephone cooperatives have added their voices to the attack on the legality of recent Air Force contracts with private telephone companies to tie together a continental defense communications network (popularly known as SAGE). These officials are concerned that the Bell system and various Independent telephone companies may have been asked to provide facilities in areas now served by the co-ops, and that such service might encroach on co-op systems.

"The Air Force has announced that it is going ahead with contract arrangements, while the Comptroller General 'reconsiders' his decision that the Air Force had insufficient authority, without congressional authorization, to negotiate it.

"If the Comptroller General should again rule against the Air Force, the next appeal would be to Congress to provide the necessary technical authorization.

"The House Appropriations Committee staff, meanwhile, is digging into the 2.4-billion-dollar program, preliminary to a congressional investigation which Democratic leaders promise will be pushed after Congress reconvenes in January. . . .

"The administration's policy to turn federal government communications business over to private companies is still being followed despite the political sniping in the wake of the Air Force 'SAGE' contract controversy (see above). Interior Secretary McKay announced this week an agreement with the Pacific Telephone & Telegraph Co. to supply telephone service at Sequoia and Kings Canyon National Parks, Cal.

"McKay said the agreement is subject to approval of the California Public Utilities Commission. The agreement provides for use by the company of present government-owned facilities in the two parks and installation of a modern communications network, including dial service."

Mo. Companies Apply for Right to Buy, Issue Stock

The Cassville Rural Telephone Co., Inc., applied on Sept. 23 to the Missouri Public Service Commission for authority to issue 100 additional shares of 6 per cent cumulative preferred stock (TELEPHONY, Oct. 1, p. 35).

The joint application of A. H. DeCanniere to sell, and Byron Bridger and Leon McDowell to purchase the telephone exchange at Laclede, was filed also on Sept. 23.

North Carolina Independent Asks to Issue Debentures

The Norfolk & Carolina Telephone Co., Elizabeth City, on Sept. 29 asked the North Carolina Utilities Commission for authority to issue $500,000 worth of debentures, proceeds of which will go to help finance additions and improvements.

The company said it expects to spend around $755,300 between Jan. 1, 1955, and Jan. 1, 1957, and that the improvements and additions will include new automatic equipment, new lines, and other facilities, and a cable across the new Croatan Sound bridge between Maneto and Manns Harbor.

The company has announced that the notes will be bought by the Connecticut Mutual Life Insurance Co., Hartford, Conn., which has bought the company's other debentures, and will pay 4⅛ per cent interest annually. The debentures, the company said, will be paid off at the rate of $25,000 a year, starting Oct. 1, 1958.

Approves EAS, New Rates For Nebraska Company

The Nebraska Railway Commission on Sept. 27 authorized extended area service (EAS) from the Burchard exchange of The Lincoln Telephone & Telegraph Co. to its Pawnee City exchange, effective with the installation of two additional circuits between the exchanges.

The order also reclassified rates for Burchard local exchange service from Group "A" to Group "B" which effects the following changes:

	Old	*New*
One-party business	$6.15	$6.90
Two-party business	4.80	5.30
One-party residence	3.00	3.25
Two-party residence	2.50	2.60
Rural	3.00	3.10

A petition requesting the extended service at the new rates was circulated among Burchard subscribers and 97.5 per cent signed it. The company then joined with Burchard subscribers in asking the commission's approval.

The company estimates the cost of additional circuits to be $7,300. Additional revenue from local rate increases will be about $312 per year. Annual loss of toll revenue is estimated at $672.

Request Authority for Utility Lines in Omaha

The Omaha (Neb.) City Planning Commission took under consideration on Sept. 21 a proposal by the Omaha Public Power District and the Northwestern Bell Telephone Co. that the city grant them an automatic right to install utility lines on the rear and side boundaries of all new lots.

Engineers representing the companies asked the commission to reserve

Of special interest to the telephone industry

This important message from Raytheon appears in TIME, Nov. 14 NEWSWEEK, Nov. 14

This advertisement is an expression of Raytheon's pride in its continuing association as a supplier to the telephone industry.

RECTICHARGER® battery chargers

RECTIRINGER® battery eliminator

RECTIRINGER® battery eliminator and ringer

TCR-12 microwave links

KTR SERIES television microwave links

RAYTHEON MANUFACTURING COMPANY
Equipment Marketing Division, Waltham 54, Mass.

• *See Raytheon's exhibit at rooms 551A and 660, Conrad Hilton Hotel, USITA show.*

"We finished the laparotomy—everything's fine. I'll call you back."

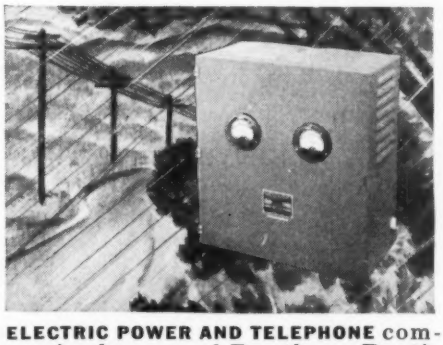
All's well, and you know it swiftly and surely by telephone. Your telephone is always ready to bring you vital information, words of assurance or welcome news from distant loved ones.

To help give you dependable service, Raytheon Recticharger power supplies are used by thousands of telephone companies. This rugged equipment not only supplies current to switchboards but keeps standby batteries ready for emergency service. A significant contribution to your convenience, this is another instance of Raytheon's ***"Excellence in Electronics."***

Laparotomy—generally describes any exploratory operation in the abdominal cavity.

RAYTHEON

RAYTHEON MANUFACTURING COMPANY, WALTHAM 54, MASSACHUSETTS



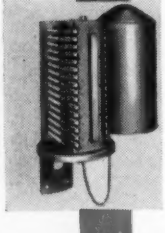
ELECTRIC POWER AND TELEPHONE companies have used Raytheon Recticharger® battery chargers for over 25 years—proved their reliable service.

LONG, LOW AND LOVELY—Raytheon Low Boy embodies advanced engineering developments in stunning console beauty. Aluminized picture tube has 21" screen.

means—protective equipment

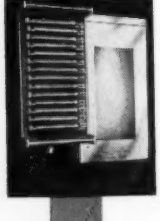
- built to last
- trouble free
- positively dependable
- low on maintenance

FEATURING THE "DOLLAR-SAVER" DISCHARGE BLOCK



Type 35 Protected Cable Terminal: Extra-strong, cast base and frame and heavily galvanized sheet-steel hood can take tremendous punishment. Two 3-ampere fuses and two .0055"-gap discharge blocks per pair.

Cat. No.	No. Pairs	6 ft. 24-ga. Stub	Shipping Wt.
SA-38	11	No	21 lbs.
SA-39	11	Yes	24 lbs.
SA-40	16	No	25 lbs.
SA-41	16	Yes	28 lbs.
SA-42	26	No	32 lbs.
SA-43	26	Yes	36 lbs.



Type 40 Protected Cable Terminal: Heavy, reversible cover allows cable to enter from top or bottom. Terminal protects 7 pairs—same fuses and blocks as above. Order SA-34 (no stub; ship. wt., 20 lbs.) or SA-35 (with 6 ft. 24-ga. stub; ship. wt., 24 lbs.).

Type 16 Substation Arrester: Two .004"-gap discharge blocks mounted on sturdy porcelain base. Order SA-57. Ship. wt., 1 lb.

Type 20 Substation Protector: Heavy-gauge metal baseplate and welded, galvanized cover stand rough handling, toughest weather. Order SB-91 (with cover; ship. wt., 4¾ lbs.), or SB-88 (no cover; ship. wt., 1¾ lbs.). Both have 7-ampere fuses and .004"-gap discharge blocks.

Address: Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7. Or Call HAymarket 1-4300.

AUTOMATIC ELECTRIC

ORIGINATORS OF THE AUTOMATIC DIAL TELEPHONE

for them "an easement to construct and maintain . . . along, across, over and under the rear and side boundary lines of each lot, together with any necessary overhang."

They said the plan could go into effect either by an ordinance or by a commission requirement in the approval of plats on new subdivisions.

The spokesmen for the companies declared such a plan would prevent neighborhood squabbles, especially in setting up street lights, because the power company would have the right to run its lines wherever the lights were needed.

United T&T of Alabama Petitions for Rate Raise

A petition by the United Telephone & Telegraph Co., Dothan, seeking a rate increase was taken under advisement by the Alabama Public Service Commission, it was reported on Sept. 21.

The company, along with the Clio Telephone Co., is being investigated by a special legislative committee for what some legislators called "poor service."

Company officials said the proposed increase would be used to finance a 1½-million-dollar bond issue for improved services to customers.

Continental Telephone Sells $9,000,000 of Bonds

Continental Telephone Co., a Gary Group company, sold privately 9 million dollars of 4¼ per cent debentures, due 1975, it was reported on Sept. 20.

White, Weld & Co. and W. C. Pitfield & Co., Inc., handled the placement.

OK Minnesota Purchases

The Minnesota Railroad & Warehouse Commission on Sept. 26 authorized the sale of the Kimball and Watkins Telephone Co., owned by James A. Innes, to Leonard H. Arvig. The companies will hereafter be known as the Watkins & Kimball Telephone Co.

Economy a Trusteeship

"We are engaged in the operation of an economy which is a sort of mutual trusteeship. What do I mean by that? The days of the Andrew Carnegies and people like him are gone . . . Hundreds of thousands of stockholders own the great corporations. The United States Steel Corporation has almost as many stockholders as it has employees. Those stockholders, through the operation of some sort of voting system, employ a group of managers."—DAVID J. MCDONALD, *president, United Steelworkers of America.*

HERE'S HOW...

Preformed Guy-Grips
CUT GUYING COSTS!

EXAMPLE:

Consider a 40-foot guy—using 5/16" (Specification grade) strand—T.S. 6000 lbs.

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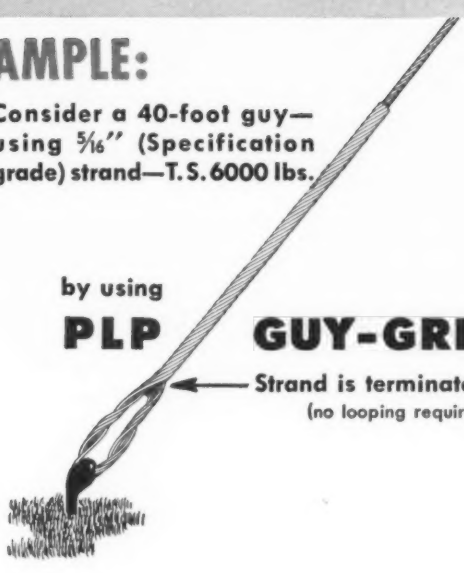
PLP GUY-GRIPS

Strand is terminated here
(no looping required)



1 Since PLP Guy-Grips eliminate looping, strand saving of 6 feet or more per guy results. **SAVING: $.29 per guy**

2 Substitute ¼" Extra High Strength Strand T.S. 6650 lbs. PLP Guy-Grips make this possible since they hold the full rated strength of E.H.S. Strand. The following strand savings result (current cost of 5/16" galvanized strand is $1.93 per guy while ¼" E.H.S. costs $1.36 per guy)*: **SAVING: $.57 per guy**

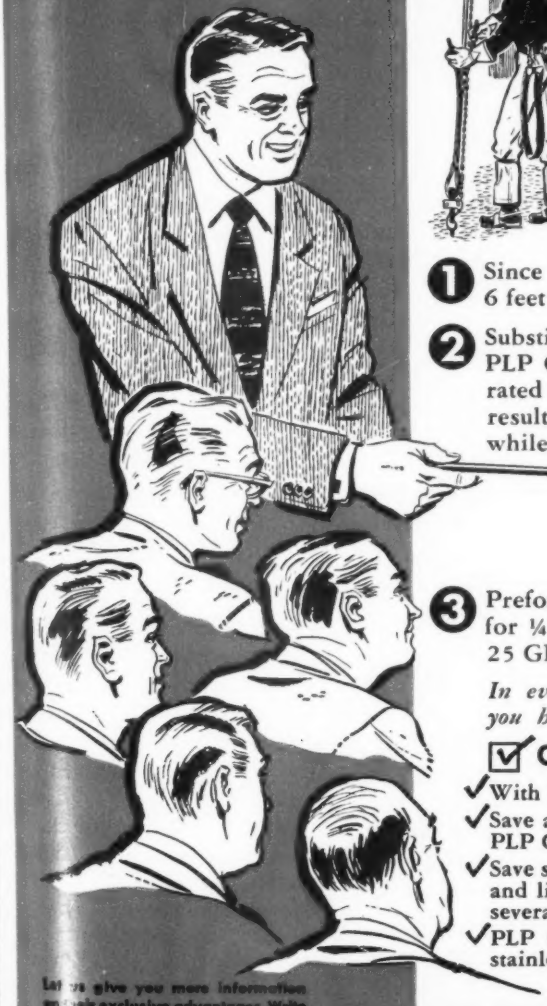
TOTAL STRAND SAVING ALONE: $.86 per guy

3 Preformed Guy-Grips cost only $.55 each for ¼" E.H.S. Strand size. (PLP Cat. No. 25 GDE-¼")

Compare this cost with your current fitting.

PLUS LABOR SAVINGS

In every Preformed Guy-Grip installation, you hold the full strength of the strand.



☑ CHECK THESE ADDITIONAL SAVINGS:

- ✓ With PLP Guy-Grips, installation savings range upwards to 50%.
- ✓ Save an additional 10% by using 3-wire strand instead of 7-wire. PLP Guy-Grips will hold 3-wire strand equally well.
- ✓ Save space and inventory costs by standardizing on PLP Guy-Grips and lighter E.H.S. Strands. One size strand can be substituted for several sizes and grades previously used.
- ✓ PLP Guy-Grips are also available in copperweld, bronze, and stainless steel.

**Based on current strand prices—75,000 feet to carload lots.*

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PLP GUY-GRIPS DON'T SLIP . . . even under impact!

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VOICE FREQUENCY REPEATERS

Continued from page 32

frequencies which may run to several thousand cycles. However, for clear crisp speech, a band of frequencies between perhaps 150 and 3,000 cycles will do the job nicely. Most telephone equipment is designed to work somewhere around this range.

Now, if other frequencies outside of this range can be excluded, the line problems are made simpler. Noise can be reduced. For instance, if 60 or 120-cycle power noise is on the line, it can be disregarded if some part of the circuit will not pass frequencies under 150 cycles or so. High frequency interference can also be disregarded if it is higher than that which can be handled by equipment of the line.

Equalization

Equalization of non-loaded lines may be done in repeater equipment. Equalizing networks are placed in the line which act as filters to trap out unwanted sounds. These may be passive —that is, combinations of coils or condensers which by-pass all high or all low frequencies to ground or short them out or otherwise block them.

Such networks are usually separate from the network which is used to prevent feed-back and singing as mentioned in the earlier chapters. However, the functions can be combined in a circuit like that shown in *Fig. 5.3.*

Here a set of coils, resistors, and condensers are connected together in a manner which will pass some frequencies better than others. In standard cable plant, these connections can be determined from charts which have been prepared previously. In other cases, experimentation or trials with a test-box network may be necessary.

When the network is properly connected, it will, in theory, have the electrically opposite effect to the irregularities of the line. If a certain frequency is transmitted very well by the line, the net will cause a loss at this frequency. A frequency which transmits over the line poorly will encounter no opposition in the network.

Now, the amount of positive feedback which comes back to the opposite grids from the plates, as mentioned earlier, is determined by the voltage on those plates. The voltage on the plates, in turn, is regulated by the losses in the network. That is, if a certain frequency encounters a big loss in the network, only a small voltage will be left at the plate, and only a little amplification will be given.

A frequency of low volume, on the other hand, will get no loss in the net and, therefore, get maximum feed-back and amplification. Under ideal circumstances, this type of repeater would amplify only those voices and frequencies which needed amplifying, and pass others through without boosting them.

Building Out

Actually, this type of network may be composed of two parts—the gain adjusting net as described above, and a building-out network for use on loaded lines. The latter would be used where the particular cable section is too short for correct operation. This building-out section would be equivalent to an artificial line.

The network was described as being the electrical opposite of the line. Actually, as far as the reactances and resistances are concerned, the effort is to make it the same as the line. Because the net is connected to the line through the vacuum tube, a phase reversal occurs. Resistance becomes negative resistance and reactance also changes in sign.

Therefore, the net "looks" like the opposite of the line characteristics. This is the requirement for negative impedance. The net, then, after reversal of sign through the tube, subtracts from the line which has the effect of lowering the line impedance.

The selection of components in the repeater can also be such that proper bandpass requirements are met. That is, the amplifier can be made to respond to frequencies within certain band limits, and to reject others that are higher or lower. This is actually done by some of the components in *Fig. 5.3.* This eliminates the need of extra filters for the same purpose.

The series negative impedance repeater is, therefore, a simple device which eliminates many of the items required in larger equipments. Among these are filters, hybrid coils, a separate output transformer, and separate equalizing networks. Because dialing and ringing pass through the series transformer easily, no special arrangement is necessary to by-pass these functions around the repeater. Further in the event of tube or power failure, the line can still be used, minus the amplification of course—but plus the loss in the transformer of the dead repeater.

All of this makes for an economical installation, and permits these repeaters to be used on short-haul circuits with a corresponding saving in wire or

It's the "Cat's Meow"
For ELIMINATING
Service Calls!
Lorain
HOWLER
You wouldn't think a cat's "meow" could decrease your service calls, but the Lorain Howler, which produces a signal tone very similar to a cat's "meow", does just that! Should your subscriber leave his receiver off the hook, the Lorain Howler will start its "meow" and will continue until the subscriber locates the source of the noise and replaces the receiver, restoring the line to service.
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LORAIN PRODUCTS CORPORATION
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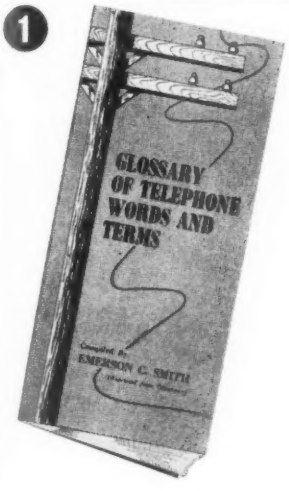
Telephony Announces... 2 NEW BOOKS

1



"GLOSSARY OF TELEPHONE WORDS AND TERMS"

By Emerson C. Smith

A 54-page (4"x8¾") reprint of five installments published in TELEPHONY. It includes definitions of 1,140 words and terms used in the telephone business. It is the only telephone glossary available. It was compiled by Emerson C. Smith, consulting engineer of Honolulu, Hawaii, who has had 26 years of experience in the technical and engineering phase of telephony. 28,000 copies have already been sold, indicating the need for such a volume. Prices are as follows:

1-101 Copies	each	$ .50
101-1000 Copies	each	.45
1001-3000 Copies	each	.40
3001-5000 Copies	each	.35
5001-10,000 Copies	each	.30
over 10,000 Copies	each	.25

"ELECTRICAL PRINCIPLES USED IN CARRIER SYSTEMS"

By Harold B. McKay

2

A 44-page (8¼"x11¼") reprint of nine popular articles which appeared in TELEPHONY. The scope of the articles include vacuum tube principles, suggestions for a new way of thinking about electrical circuit components, actual parts and functions of carrier systems and a guide to trouble shooting on carrier equipment. It is ideal for use in training schools. The author has been in the radio and telephone communications field since 1920 and has had a broad experience in carrier design and operation. 4,000 copies of this reprint already have been sold. Prices are as follows:

1- 100 Copies	each	$ .75
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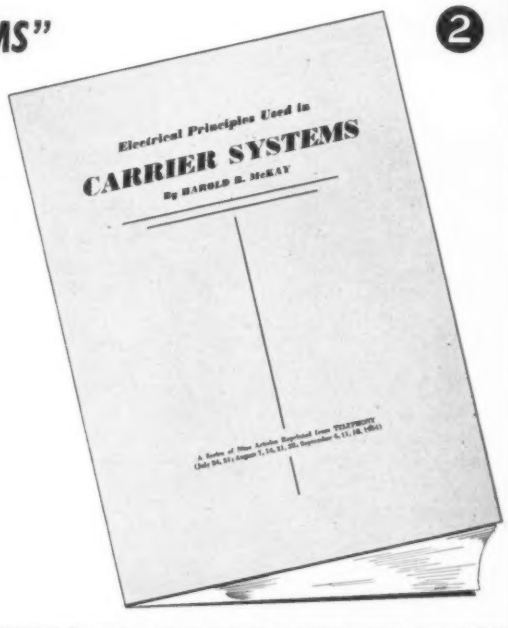
301- 400 Copies	each	.60
401- 500 Copies	each	.55
501-1000 Copies	each	.50
over 1000 Copies	each	.40



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CITY_____ ZONE_____ STATE_____

cable costs, because of the smaller gauges which can be used.

Problems

However, the series negative impedance repeater is not without its problems. It will be remembered that the amplified voice is in series with the line. That is, the amplifier causes more current to flow in the series circuit composed of the transmitter, amplifier, line, and receiver.

Of course, this permits the repeater to amplify in both directions, because in the series circuit it does not matter at which end the voltage starts and where it is received. This permits two-way conversation without the use of hybrid coils, but it also causes echoes.

This is because as the total current on the line is increased, the amount going back to the transmitting end is increased just as much as that going to the receiving end. Being a series circuit, the current is equal in all parts of it. Another way of looking at this is that the negative impedance of the repeater in the line constitutes a discontinuity, and reflections result from the discontinuity.

Whatever the point of view, echoes can be tolerated if the lag is not too great. For instance, we hear our own voice as we talk anyway, and presumably are used to it. However, if our voice comes back after an interval, it can be very annoying and confusing.

The time lag of such echoes on telephone lines is dependent upon a number of factors, including the length of the line and the return loss. However, in practical application, it means that the series negative impedance repeater is limited, because of this, to use on inter-office trunks and some tandem circuits.

The use of this repeater on toll connecting or toll completing circuits may prove undesirable because of this echo effect, because the amplification would have to be kept down too low. However, the economic advantage of this simple repeater is such that efforts have been made to extend its use to the longer circuits.

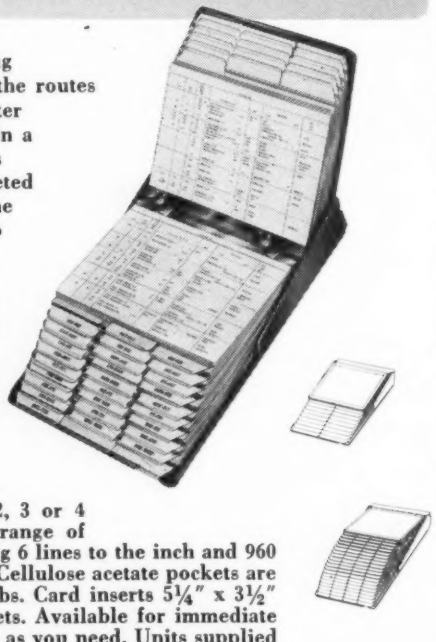
Out of this need was developed a practical negative impedance repeater which is used in shunt across the line. Actually, it is used in combination with the series repeater and offsets the echo effect of that device. A repeater of the shunt type will be described in our next article.

(To Be Continued)

ACME VISIBLE

MULTI-CARD BULLETIN HOLDERS

for Long Distance Inter-Toll Dialing



One operator with her individual Routing Multi-Card file, containing over 95% of the routes for originating traffic, can do the job faster and more efficiently.—No need to bring in a second operator.—No guess work; routes are before her—*visible*.—Calls are completed quicker.—More routes are available to the Central Office force.—Less "121" calls go over the LD circuits. With Multi-Card Bulletin Holders, each operator can determine over 95% of her routings and rates, and immediately compute charges on Coin Box calls or where there has been a request for T & C. By not trunking to Rate & Route operator, less operator time is needed at these positions.

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Units have 10, 15 or 20 hangers, with 2, 3 or 4 pockets per hanger to provide a wide range of capacities—from 720 to 2,880 listings using 6 lines to the inch and 960 to 3,840 listings using 8 lines to the inch. Cellulose acetate pockets are 5¼" wide x 4⅜", with slant-cut index tabs. Card inserts 5¼" x 3½" are used in both front and back of pockets. Available for immediate shipment; you may order one or as many as you need. Units supplied complete with insert cards and labels for index tabs.

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District Offices and Representatives in Principal Cities

Hold Five-Day Plant School In Washington State

Representatives of eight Washington state Independent telephone companies in late August took part in a five-day plant school sponsored jointly by the Washington Independent Telephone Association and Pacific Telephone & Telegraph Co.

Subjects covered were: Outside plant construction, telephone installation and central office maintenance.

The Washington association bulletin had the following to say about the training sessions (quoted in part):

"In addition to the training on construction, repair and maintenance, a special session was held dealing with sales opportunities for plant employes.

"Particular emphasis was placed upon the revenue which could be produced through telephone extensions, bells, gongs, cut-off keys and other services available to the subscribers.

"From all reports, this first training school was very successful and should lead the way to the establishment of procedures and practices which will become a permanent part of the many joint undertakings of the telephone industry in Washington."

NW Bell Names L. O. Arstad Assistant Vice President

L. O. Arstad, general manager for Northwestern Bell Telephone Company in Nebraska became assistant vice president, engineering, effective Oct. 1, according to an announcement by President A. F. Jacobson on Sept. 5. Mr. Arstad will succeed T. H. Granfield, who will retire on a service pension as of that date.

Mr. James B. Moore, Sioux Falls, S. D., succeeds Mr. Arstad as general manager for Northwestern Bell. Mr. Moore has served as general manager for South Dakota for the past six years.

Genius Applied

"A time will come when the science of destruction shall bend before the arts of peace; when the genius which multiplies our powers, which creates new products, which diffuses comfort and happiness among the great mass of the people, shall occupy in the general estimation of mankind that rank which reason and common sense now assign to it."—FRANCOIS ARAGO.

Importance of People

"The growing importance of the individual can be seen in his role today as employee, as a political entity, and as a citizen and social being."—HOLGAR J. JOHNSON, *president, Institute of Life Insurance.*

Mr. Thompson with one of their "new-looking" 20-year poles.

Pressure-Creosoted poles installed in 1916 still in service!

• The length of service received from any type of equipment is usually the truest test of its value and real cost. This is certainly the case with pressure-creosoted utility poles. Take the record of the Iowa-Illinois Gas & Electric Co., of Davenport, Iowa.

This utility, which serves 100,000 residential and commercial customers in both urban and rural areas, has been using pressure-creosoted poles for a long time. "Creosote-treated poles last even longer than we had expected when we originally purchased them. We've been using them since 1916 and still do not know when a creosoted pole can be called old," says Mr. William Thompson, construction supervisor. "Many of our oldest poles have been removed from their original locations. In at least one case that I can recall, poles installed in 1923 were pulled out of a 25-mile stretch in 1944, found to be in excellent shape and reinstalled in rural areas in 1945."

Mr. E. F. Miller, manager of Iowa-Illinois Electric Transmission and Distribution Division, adds, "In 1945 and 1946, we pulled out about 300 creosoted poles that were over 30 years old. Only 3 poles had to be junked . . . the rest were put back into service in various rural lines."

A good record? Certainly, but not unusual when you use utility poles pressure-treated with a good grade of creosote—like USS Creosote. For more information on this quality wood preservative, contact our nearest sales office or write to United States Steel Corporation, 525 William Penn Place, Pittsburgh, Pa.

You can obtain clean pressure-creosoted poles upon specification without sacrificing pole service life.

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REA ASSIGNS LOANS

Continued from page 33

Fla., on Sept. 22 gained an allocation of $1,007,000 to improve and extend rural telephone service in Holmes, Jackson and Washington counties.

This new borrower is a commercial telephone company. It plans to expand its system to serve 1,236 additional farm homes and other rural establishments now without telephone service. The company already furnishes dial service to 393 subscribers over 81 miles of line.

In order to provide integrated dial service for the area it intends to serve, the Tri-County company proposes to acquire 27 miles of line and other facilities of the Southeastern Telephone Co. These facilities serve 355 subscribers in and around Bonifay.

The REA loan funds will enable the borrower to improve service for the existing subscribers as well as to offer initial service to new subscribers. Of the 108 miles of pole line which the company owns or intends to purchase, 48 will be used in the expanded system, 52 will be rebuilt and 8 will be retired.

Loan funds also will finance the construction of 378 miles of new line, a new automatic exchange at Westville and a combined central automatic exchange and commercial office building to replace the present facilities at Bonifay. Automatic facilities at Cottondale, Grand Ridge and Sneads will be expanded. The proposed changes will make possible modern dial service over an integrated system for 1,984 subscribers in northwest Florida.

W. E. Quattlebaum Jr. is president and manager of the Tri-County Telephone Co.

*

Wikstrom Telephone Co. Inc., Karlstad, Minn., received its allocation of $291,000 on Sept. 23 for the purpose of improving and extending telephone service in Kittson and Marshall counties.

The new borrower, a commercial company, now furnishes magneto service over 139 miles of line to 321 subscribers in its area. The company plans to convert the existing system to automatic operation and add facilities to serve 231 additional rural subscribers. Of the existing pole line, 20 miles will be retired and 119 miles rebuilt.

The borrower proposes to add 106 miles of new line and to construct new automatic central offices at Donaldson, Karlstad and Strandquist. Present plans include continued service without toll charge between the Karlstad and Strandquist exchange areas. These changes will make possible modern telephone service to 552 rural subscribers in the two counties.

George Wikstrom is president and manager of the company.

*

Sanborn (N. Y.) Telephone Co., Inc., also on Sept. 23 was granted a loan of $672,000 to finance the extension and improvement of rural telephone service in Niagara County.

The new borrower, a commercial telephone company, plans a modern telephone system to serve 2,694 rural subscribers. It now provides dial and magneto service to 961 subscribers over 76 miles of line.

The loan will make it possible for the company to bring service for the first time to 1,733 subscribers and to give better service to present subscribers. It plans to build 49 miles of new line, rebuild 35 miles of existing line and construct a new automatic central office at Sanborn to serve the whole system.

Thirty-four miles of line in the present system will be used in the expanded system, and 8 miles of existing line will be taken out of service. Loan funds will also be used for retirement and refinancing of the borrower's indebtedness.

At present the company plans to include service without toll charge between its exchange and the city of Niagara Falls. When complete, the system will consist of 118 miles of line.

William B. Harrison is president and manager of the Sanborn company.

*

A $45,000 loan for the Tri-County Telephone Association, Basin, Wyo., its second REA loan, was approved on Sept. 23.

The borrower plans to use these funds, together with $254,000 in funds previously approved, to furnish new and improved service to 463 rural families in Big Horn and Washakie counties. The system will consist of 266 miles of line in two non-contiguous areas. Dial central offices will be located at Burlington and Ten Sleep.

Earl Davis is president of the Tri-County cooperative association.

*

Haxtun (Colo.) Telephone Co. was authorized to obtain $106,000, in loan

"What a drive . . . almost all the way to the next pole!"

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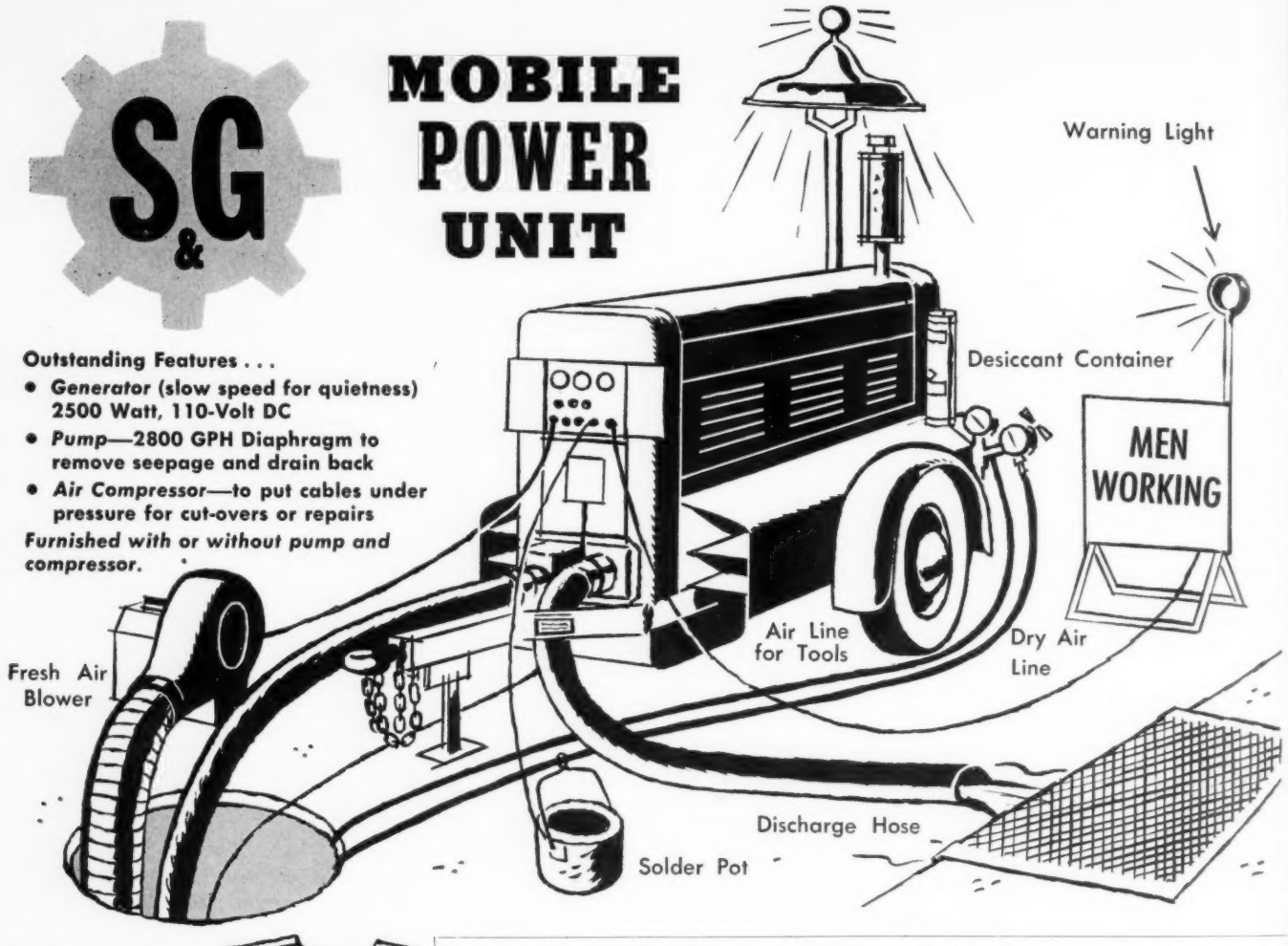

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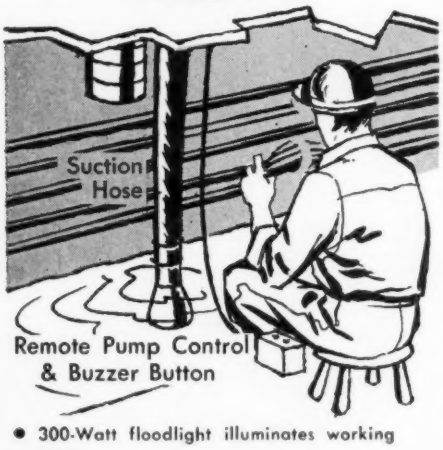
- ***Pump*****—2800 GPH Diaphragm to remove seepage and drain back**
- ***Air Compressor*****—to put cables under pressure for cut-overs or repairs**

Furnished with or without pump and compressor.



- 300-Watt floodlight illuminates working area
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- diaphragm pump can be operated from manhole by push button control
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funds, second REA loan to this borrower.

The Haxtun company plans to use these funds to expand its service in Logan County. It proposes to acquire the Crook Telephone Exchange now serving 93 subscribers over 45 miles of line, convert it to dial operation and add facilities to serve 105 rural families now without telephones.

Of the existing pole line, 8 miles will be retired and 37 rebuilt for use in the new system. In addition, 56 miles of new line will be added, and a new automatic central office built at Crook.

The two REA loans, totaling $473,000, will enable the Haxtun company to furnish new and improved telephone service to 917 subscribers over 380 miles of line in Logan, Phillips, Sedgwick and Yuma counties. Automatic central offices will be located at Haxtun and Crook.

Floyd L. Reyher is president and manager of the Haxtun company.

*

Sept. 16 was also the approval date for East Ascension Telephone Co., Gonzales, and a $596,000 loan, the company's fifth REA loan.

The borrower plans to use the funds to finance the construction of 143 miles of line and other facilities to serve 1,505 additional subscribers. These prospective subscribers are located in the company's present territory and in a new area in Livingston Parish having no service at present.

Funds also are provided in the loan for a new office building at Gonzales.

Loans to the East Ascension company now total $1,472,000. The funds will enable the East Ascension company to serve 3,602 subscribers over 456 miles of line in Ascension and Livingston parishes. The Gonzales exchange is now furnishing dial service to more than 2,000 subscribers. The second and third exchanges of the system will be located at French Settlement and Maurepas.

Mrs. Anona Banker is president of the East Ascension company.

*

Chariton Valley Telephone Corp., Bucklin, Mo., on Sept. 16 gained allocation of $227,000, the company's second REA loan.

The cooperative plans to use these

(Please turn to page 57)

funds to furnish modern telephone service to 507 subscribers in Chariton, Monroe and Randolph counties. As a nucleus for the expanded service, the organization proposes to acquire with its own funds the Jacksonville Telephone Exchange, the Leesburg Mutual Telephone Co., Duncans Bridge, and the Prairie Hill Mutual Telephone Co. The acquired facilities are furnishing service to 254 subscribers and switchers over 140 miles of line.

The borrower plans to construct a complete new outside plant consisting of 160 miles of line. All of the acquired line will be retired. New automatic central offices will be constructed at Jacksonville and Prairie Hill. The added facilities will enable the Chariton Valley cooperative to offer improved service to the existing subscribers and initial service to 253 families and other rural residents now without telephones. The switchers plan to abandon their lines and become regular subscribers of the borrower.

The two REA loans, amounting to $594,000, will make possible dial service to 1,291 subscribers in Chariton, Linn, Macon, Monroe, and Randolph counties. Automatic offices will be located at Bucklin, Bynumville, and Ethel, in addition to the two new ones in the Sept. 16 loan. The completed system will consist of 375 miles of line.

George T. Holman is president and Earl L. Bennett is manager of the Chariton Valley cooperative.

*

Texas County Rural Telephone Corp., Houston, Mo., on Sept. 16 was designated for a loan of $474,000, its first loan, to improve and extend rural telephone service in Shannon and Texas counties.

The new mutual organization has no existing facilities. It plans to use its own funds to acquire the Summersville Telephone Co. as a nucleus for the new system. These properties are now providing magneto service to 76 subscribers over 28 miles of line.

The Texas County group proposes to use the loan funds to improve the existing system and add facilities to furnish modern service to 741 additional rural families in the area. It plans to construct new automatic central office buildings at Summersville and Tyrone, and 337 miles of new line. Only one mile of the acquired line will be utilized in the system; 27 miles will be retired. The borrower's present plans include service without toll charge between the two exchanges.

E. L. Daugherty is president of the Texas County mutual organization.

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NEOPRENE JACKETED DROP WIRE

LASTS LONGER • COSTS LESS!

Every coil of ALPHADUCT drop wire is dated by means of a color coded thread which indicates the year it was manufactured. In this way, with no record keeping, no muss, fuss or bother, you can tell how long Alphaduct stays up without requiring service or replacement.

We know that our dumbbell type neoprene jacketed drop wire will last. It's tested thoroughly through every manufacturing stage. The tough neoprene jacket resists abrasion, moisture, sunlight, oil, water. The insulation sticks tightly to the conductor. The dumbbell or figure eight shape makes the wire easy to split, makes a neat installation.

You, too, may know all this for sure by trying Alphaduct drop wire. And . . . by dating the wire we make it easy for you to prove to yourself that this is the most sensible drop wire investment you've ever made.

IT'S DATED • FOR YOUR CONVENIENCE AND PROTECTION

ALPHADUCT WIRE AND CABLE COMPANY
MILLTOWN, NEW JERSEY

NATIONAL DISTRIBUTORS—LEIGH SALES CORPORATION—CHICAGO, ILL.
REGIONAL DISTRIBUTORS—THE LINDSAY TELEPHONE SUPPLY CO., CLEVELAND, OHIO
PANKEY SUPPLY COMPANY, CHARLOTTESVILLE, VA.

construction and maintenance DIGEST

- **Ambidextrous terminal**
- **25-year battery**
- **It's a howl**
- **Power plus for PBX**

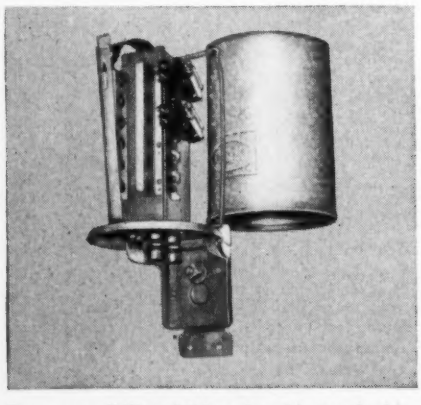
Published every week to help you get the most out of your materials and supplies dollar

by C. J. Reynolds, Stromberg-Carlson Company

The few dollars you spend on *reliable* equipment today will be repaid a hundredfold in lower maintenance costs for years to come. Protect your investment with the double guarantee offered by Stromberg-Carlson. First, leading manufacturers build this equipment, and guarantee it. Second, because we recommend and sell this equipment to the telephone industry, we *also* guarantee its performance!

Versatile terminal for plastic cable installations

If you're installing plastic cable, you'll want the S-20V pole cable terminal, with its two cable entrances, each of which is arranged to accommodate compression couplings ranging from 6 pair to 51 pair in size.



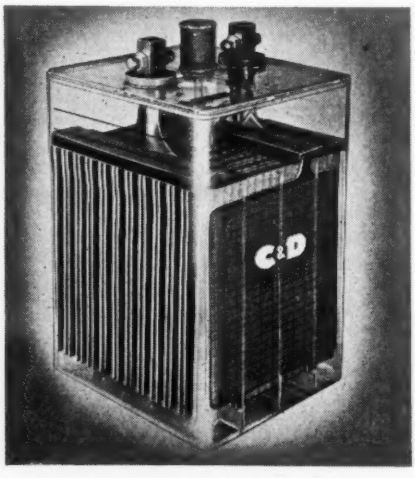
Easy accessibility of this pole cable terminal interior makes it ideal for use with plastic cable.

When only one cable entrance is required, you close the dead entrance with a standard pipe plug. These features, combined with the flexibility of Cook Electric Company's H-20 protector units, make the S-20V protected pole cable terminal probably the most versatile pole cable terminal available.

Battery will still have its pep when 1980 rolls around

It will last 25 years—in full float service! That's the life expectancy of C & D's PlastiCal (lead-calcium grids) telephone battery.

You get this extra-long, trouble-free operation because C & D Batteries, Inc. use an exclusive suspended and supported plate construction.



In full float service, this telephone battery stays on the job a quarter of a century.

Illustrated here is a typical C & D telephone battery with a 660 A.H. capacity. When ordering this 25-year battery, specify PCE-660.

When you find that a 14-year expectancy meets your needs, you can get dependable operation from a C & D PlastiCell (high-tensile lead alloy grids) battery. For a PlastiCell with capacity of 660 A.H., specify CE-23.

You can order either of these C & D telephone batteries, plus other capacities, from your Stromberg-Carlson representative. Ask him about extra-long-life power supply with C & D Batteries.

Puts up a howl, gets receivers back on the hook

Here's how to eliminate those wasteful service calls, when you have to tell a subscriber to replace his receiver on the hook.

Compact and easy to handle, this little fellow has the voice to make himself heard!

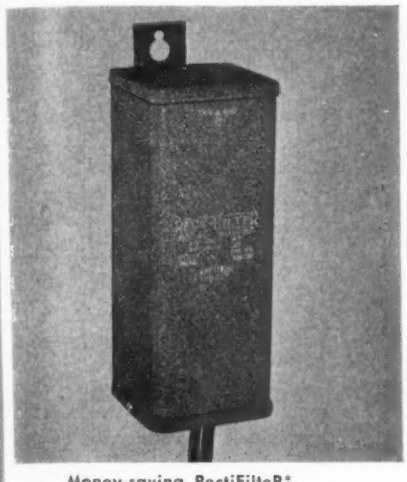
You can keep those party lines clear with the device shown here. It's the Lorain Howler, a signal tone generator that simply plugs into the line at the test desk, and gives a distinctive howling sound to attract the subscriber's attention. Starting at low volume and high frequency, this signal changes to a loud, low tone, passing through a range that is most suitable for the human ear and your equipment to receive.

Because the tone starts at low volume, even if a subscriber has his receiver to his ear, there is time to remove it without the sound becoming painful.

Because of its distinctive and penetrating quality, the Lorain Howler's tone can be sent out at a much lower voltage than other signals used for this purpose, reducing the possibility of damage to the receiver or cross talk in the cables.

Keep your PBX customers happy with this dependable power unit

A steady, economical supply of DC power is one of the things you need for an efficient PBX—and a happy PBX customer. Here's how to provide that better service, with big savings.



Money-saving RectiFilteR*.
"Just plug it in and forget it!"

For more than two decades, leading independent telephone companies have found that Raytheon RectiFilteRs are the most economical and efficient way to supply steady DC power to PBX boards directly from an AC source.

With no moving parts, the Raytheon RectiFilteR requires neither adjustment nor maintenance. It will outlast many sets of batteries, release wires carrying charging current from central office to subscribers' PBX boards for revenue producing service, and minimize power cost because of high efficiency in converting from AC to DC.

Dry disc rectifying units and other components are designed for long-life, trouble-free service. The Raytheon RectiFilteR will end your telephone power problems. Just plug it in, close the door—and forget it!

Distributed by

Stromberg-Carlson®

ROCHESTER 3, NEW YORK

A Division of General Dynamics Corporation

Sales Offices: Atlanta 3, Chicago 6, Kansas City 8, Rochester 3, San Francisco 3.

LaCroix Award Goes to Operator for Flood Service

A telephone operator in the small town of Ozona, Tex., has been presented the LaCroix certificate of meritorious service by General Telephone Co. of the Southwest.

For her service beyond the call of duty during the June, 1954, Ozona flood, Mrs. Gladys Cox was presented the

MRS. GLADYS COX

award by W. G. Wright, president of the company, at a dinner in Ozona on Sept. 13. She also received a cash award.

During the early morning hours before the flood became imminent, Mrs. Cox made frequent calls from her home to the operator on duty to offer her help should the relief operator need assistance. As soon as Mrs. Cox became aware of the flood danger, she immediately left her home and went directly to the telephone office, arriving at the office about 4:45 a.m.

She then endeavored to clear the switchboard of the many signals and in many instances handled calls for help and assistance from subscribers. One such call notified Mrs. Cox that an elderly invalid was trapped in her bed and that the flood waters had risen to the bed. There was serious danger of the invalid drowning. Mrs. Cox contacted her husband who, with the help of another citizen, went to the invalid's home and removed her from danger.

While working at the switchboard, Mrs. Cox became aware of a fire in the equipment in the telephone office and immediately notified the plantman, who ordered the operators out of the building for their own safety.

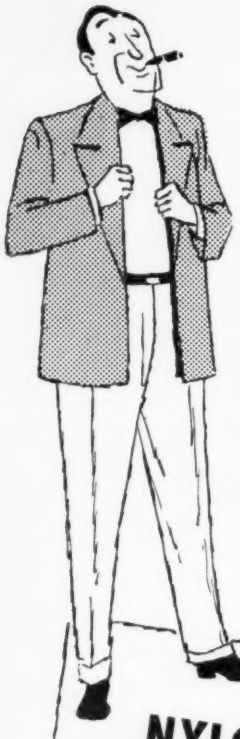
When Mrs. Cox left her switchboard, not only was the equipment on fire, but the flood waters had become 6 inches deep in the exchange. Her service, however, did not cease. She went to the sheriff's office and requested them to notify the San Angelo telephone people by radio of the flood and its damage to the telephone facilities. She then worked throughout the day and late into the night, helping in every way possible to carry out the responsibilities of the telephone company during this emergency.

The LaCroix awards are named for the late Morris F. LaCroix who was chairman of the board of directors of General Telephone Corp., and the individual chiefly responsible for establishing the General System as it is today. The awards, inaugurated last year, recognize acts of merit that extend beyond the assignments normally associated with telephone positions, generally connected with such disasters affecting telephone service as: saving of human life, fires, floods, explosions, drownings, and similar catastrophes.

Increased Leverage

"As of June 30, 1939, about 4,849,000 persons were receiving a federal

Both the General Telephone Co. of California and Kaufman's department store, Santa Monica, received an advertising boost recently when the store used telephone equipment as a background "tie-in" for a fall merchandise display.



which type jacket do you prefer ?

NYLON ?
NEOPRENE ?
MERCERIZED COTTON ?

COMMERCIAL makes *all three* . . . REGULAR type Cords with either Mercerized Cotton or Nylon Jackets . . . RETRACTABLE and REGULAR type Cords with Neoprene Jackets . . . for all makes and types of Telephone instruments.

AND DID YOU KNOW that Commercial Switchboard Cords are now available with or without plugs?

Write for Catalog and Samples

COMMERCIAL CORD & SUPPLY CO. INC.

26 E. Main St. • Clifton Springs, N. Y.

Phone: CLIFTON SPRINGS 189

check every month. In 1953, 14 years later, 20,120,000 were receiving a regular monthly check from the government. In short, the political potency of this factor has increased 400 per cent since 1939."—HOWARD BUFFETT, *former U. S. Representative from Nebraska.*

48 Illinois Bell Executives Are "Off to School"

Sept. 19 was the "first day of school" for 48 "middle management" executives of the Illinois Bell Telephone Co. in Chicago. The students, ranging in age from 35 to 60, checked in at a local hotel, their "campus" for the next two weeks.

The course, based on the "case system" used in law schools and at such business schools as Harvard's is designed to teach the other fellow's problems, to broaden the individual's outlook and generally to sharpen up and develop management skills.

In assigning rooms, care is taken to mix the students, to avoid putting men from the same department together, so there may be a maximum exchange of ideas at the after hours social sessions. The course is held away from company offices and daily job details in order to create an atmosphere favorable to idea exchange and to study.

The "students" are not graded or graduated, and their performance has no direct effect on their job status, but they go to work at the very first meeting, and thereafter are busy from 8:15 a.m. to 8 p.m. Actual cases, reports of problems which have arisen in various companies including Illinois Bell, are at the core of the course, but required outside reading is assigned each day.

Cases are discussed against a background of the men's own experience and the reading, first in groups of 12, then in a general session. The small sessions are conducted by one of the "students;" the combined sessions by the conference staff.

The discussion of cases, which cover everything from corporation finance to coffee breaks, is followed by a daily session called "talking with people," during which the executives discuss the best ways to deal with individual problems both from a company and personal viewpoint. Again, real life stories are used.

After dinner, a top level executive comes in to discuss the workings of his department, providing a sort of cross-pollination of ideas. In addition to discussion leaders culled from company ranks, outside experts, such as Northwestern University professors, take part in the course. Illinois Bell's general personnel manager is "principal."

The course is the outgrowth of a Bell-System company-wide conference and study made two years ago, which ran a similar pilot conference.

Illinois Bell has enlarged the scope of other conferences held elsewhere within the system, stressing not only personnel and public relations and financial problems, but the understanding of other departments and the exercise of skills.

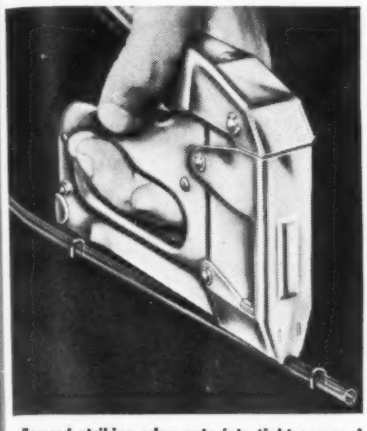
On Oct. 9, a group of recent college

Time is Important !
For CORRECT TIME, CALL
C-0543
a public service of . . .
Merchants National Bank
7th. and Wabash Ave.
TIME TO SEE ABOUT A NEW CAR LOAN

The Citizens Independent Telephone Co., Terre Haute, Ind., entered into an agreement recently with the local Merchants National Bank to provide "time of day" service. The automatic time equipment used to provide this service is the time announcer unit manufactured by the Automatic Electric Co., and is the first installation of this equipment in the state of Indiana. Above is an example of the city-wide bill board advertising being used by the Merchants bank to supplement their newspaper and radio advertising of the new service.

NEW! Arrow's T-25 Staple Gun for Low Voltage Wire!

For Wire Up To ¼" in Diameter . . . Bell, Thermostat, Radiant Heat, Telephone, Inter-com, Burglar Alarm, etc.



Tapered striking edge gets into tight corners!

T-25 AUTOMATIC STAPLE GUN *for wires up to 1/4" in diameter. Uses 7/16" and 9/16" round crown staples, galalloy-coated for high rust resistance. Also available in rust-proof Monel wire.*

LIST $15.

SAFE!

Can't damage wire because staples automatically stop at right height! Won't even break ¼" hollow glass tubing.

FAST!

Proved by test 6 times faster than old hammer method. Saves you 70% in fatigue and efficiency . . . saves many dollars a year.

HOLDS!

New staples get tremendous holding power from tack points that spread to lock themselves into wood!

Write for catalog and information.

ARROW FASTENER CO., INC.
ONE JUNIUS STREET, BROOKLYN 12, N.Y.

SERVING YOU—SINCE 1932

•

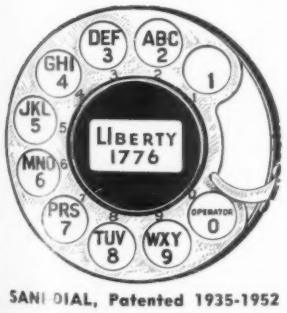
INVENTORS and THE DIAL TELEPHONE SYSTEM

How much thought is given by management to the INVENTORS who keep the business in the profit line? And how do inventors fare? No Commissions to go to for Higher Rates for the inventor. But there are means to protect Invention Property, such as ETHICS, LICENSES and Agreements.

Since the undersigned inventor has contributed the following inventions that are now in use, licenses are open to all users of dials with the exception of the "CUT-AWAY" (Licensed) finger wheel that has been purchased from your supplier.

THEY ARE—

1. Silent Pawl for the sprocket drive dial.
2. Dust-Shield for the Dial mechanism.
3. Sanitary Transmitter cap. (W.E.Co.)
4. Dial Light for the dial. (W.E.Co.)
5. Light reflecting finger-wheels. (W.E.Co.)
6. "No Blind-Spot" Finger Wheels. (W.E.Co.)
7. "No Blind-Spot" Numberplate. (Extended)
8. Sprocket Cam.
9. FASTER and EASIER, no "BLIND-SPOT" Dialing.
10. CIRCUIT TIME SAVING by "No Blind-Spot" Dialing.



SANI DIAL, Patented 1935-1952

A single second saving in time, results in over 4 years circuit time savings, in the 150,000,000 calls made daily by Bell System customers. Since this saves many calls lost to "LINE IS BUSY," TELEPHONE COMPANIES PROFIT and the Public is served.

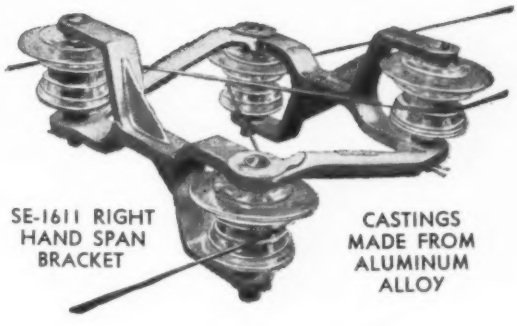
If your company uses the above inventions within your dial, you may write for a license application on a reasonable basis that will not injure your Treasury. Some small companies are invited to use the inventions FREE of any charge, if they are not able to pay.

YOUR GOOD WILL IS APPRECIATED

JOSEPH A. PETNEL, *Inventor*

598 THIRD AVENUE • TROY, NEW YORK

Get IN CASE* YOU ~~WANT~~ A REAL MONEY SAVER



Especially adapted for carrier circuit construction

YOU GET ECONOMY

CASE* span brackets help you save on the number of poles in new line construction and in reconstruction; long spans are possible.

YOU GET QUALITY

Fabricated from lightest of all structural metals; equipped with Hemingray glass insulators; eliminate cross talk; easy to install.

RC-1 rubber insulators for use in areas where breakage of glass insulators is known to be prevalent.

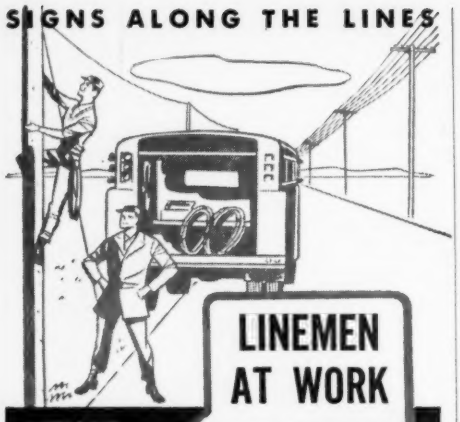
Type 1088 Hemingray glass insulators complete with rubber bushings.

SOLD BY LEADING DISTRIBUTORS IN THE UNITED STATES

Also available
CASE ALUMINUM TRANSPOSITION POINT BRACKETS

TRANSANDEAN ASSOCIATES, Inc.
P.O. BOX 214, ORANGE, N. J.
Consulting Engineers and Constructors

SIGNS ALONG THE LINES



LINEMEN AT WORK

USING

Crapo GALVANIZED

GUY & MESSENGER STRAND

Positive strength and durability economies, combined with the superior qualities of steel, make Crapo Galvanized Steel Strand a rugged performer. The heavy, ductile, tightly-adherent galvanized coating — applied by the famous Crapo Process — provides dependable protection for the steel, prolongs the expectant life of the strand. There is a size and grade of Crapo Galvanized Strand for every practical need.

INDIANA

STEEL & WIRE COMPANY, INC.

Muncie, Indiana

graduates comparatively new to the company will go through a similar course. Courses are also held for non-college management people advanced from the ranks, whose service time may range from six months to 15 years.

Japan's First Modern Dial Service Cut in by Kellogg

The beginning of the end to such troubles as unlucky numbers and telephone "brokers" which have plagued the Japanese telephone system for 50 years was indicated by the cut-over to its first modern dial installation on Sept. 11 at Takasaki by the Kellogg Switchboard & Supply Co., division of the International Telephone & Telegraph Corp. A 5,300-line installation valued at nearly 2 million dollars marked the initial step in a complete revamping of the government-owned telephone system under the direction of the Ministry of Telecommunication.

While automatic telephony is not new in Japan, no real improvements have been made to its communications set-up for the past 20 years. At present there are approximately 1.7 million telephones in Japan which compare with an estimated demand of five times that number indicating the pent-up desire for expanded service. After much study it was decided to turn to American sources for the kind of equipment needed.

In addition, two unattended dial telephone exchanges were installed, one at Kuragano and the other at Annaka. They are the first of their kind to be placed in service in that country.

All of the new automatic equipment is of the Kellogg cross-bar type. In addition there is a 58-position toll board with integrated ticket-tube equipment manufactured by IT&T's German affiliate, Mix & Genest.

Japanese telephone service has been plagued by earthquakes, depressions and war since telephones were introduced in the 1880's. Added to these is the fact that certain numbers are considered unlucky, while the lack of telephones resulted in the rise of the telephone "broker" who bought and sold rights to telephone lines. The over-all result was that service soon became chaotic.

To own the rights to several telephone lines for instance, meant that the owner would never be out of a job, for companies in Japan would readily hire anyone who could then assign a line or two for its use. Telephone service was so hard to come by that brokers received from $300 to $1,000 for a line, and during World War II the price went to triple that amount. For those lines which were returned to the telephone system itself, which was rare, a lottery was held annually and the winners were then in a position to apply for service when, as and if lines opened up, usually only because of death or added equipment.

The matter of unlucky numbers meant that only 10 per cent of the available numbers could be used. The numbers "4" and "7" when spoken in Japanese sound the same as the words for "death" and "pawnshop," respectively, while "83" can be taken for the word "bankruptcy." Especially objectionable is "42" because its pronunciation ("hassan") is like the verb "to die."

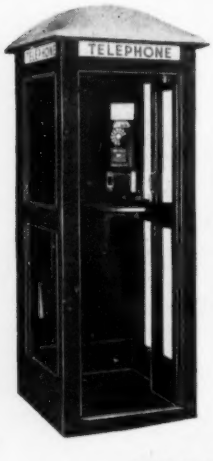
Takasaki, Japan, exchange building in which Kellogg Switchboard & Supply Co. recently cut over a 5,300-line dial installation.

The New

UNIVERSAL

DOME-O-LITE

WAVELL TELEPHONE BOOTH



Now

ILLUMINATED SIGNS

Pilfering and Vandalism Stopped
Reduce Shipping and Storage Space
Easy, Fast Repair
Yellow DOME Lights Automatically
Interior Lights Automatically
Signs Light Automatically

ORDER NOW!

COMPARE REVENUES..

WAVELL

SHOW CASE and FIXTURE INC.

1395 CORONADO AVENUE

LONG BEACH 4, CALIFORNIA

RARE GAS RELAY KILLS INTERFERENCE!

OVER 1/4 MILLION IN USE!

Party Line Transmission and Ringing Improved with Vincent Rare Gas Relay RTC-2

HERE ARE THE FEATURES:

1. Ends all objectionable noise.
2. Prohibits false ringing.
3. Easily installed in all types of equipment.
4. Lightning protection.
5. Non-mechanical, no maintenance.
6. May be used with harmonic or coded bells.
7. May be used on magneto or common battery lines.

$3.62
LIST PRICE

THE THEORY OF OPERATION —

Since the resistance of the relay is infinity below 60 volts, (The relay's normal breakdown voltage) the line remains normally free from paths to ground. Ringing voltages of over 60 volts ionizes the rare inert gases, and therefore is transmitted without difficulty.

FREE: **TECHNICAL BULLETIN, WRITE DEPT. 48-A.**

Brach

SINCE 1906

BRACH MANUFACTURING CORPORATION
Div. of General Bronze Corp.
200 CENTRAL AVENUE, NEWARK 3, NEW JERSEY
HUmboldt 2-1500

Loosens FROZEN PARTS FAST!

Handy
Won't Leak
Shoots 3 Feet

Same formula as famous Kroil that has pleased 14,000 industrial users for 10 years or more.

Loosens stuck together metal parts, bushings, bearings, bolts, screws, pipe, etc., "anything from an embalmer's needle to a bulldozer," one customer said.

"Like an extra employee," said another. "Turned rust into mush, put $50,000 equipment back to work."

You too can get these results.

Try Aerokroil at our risk. Send $2 cash, and we'll pay postage.

KANO LABS. 1040 S. Thompson Lane Nashville 11, Tenn.

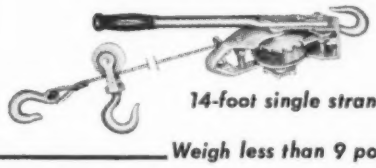
12-OZ. CAN $2. F.O.B. NASHVILLE CASE OF 12 $18.75

ACCO Quality

Wright Type "R" PULL-A-WAY

Write for Bulletin DH-163B

5-foot double strand 3000-lb. pull



14-foot single strand 1500-lb. pull

Weigh less than 9 pounds

Sturdy · Light · Safe · Economical

Here are some of the fine features of WRIGHT Type "R" Pull-A-Way: Drop forged ductile aluminum alloy frame • Wire hoist cable of maximum strength and flexibility • 8" minimum handle movement—for close hook-ups • 2" drum hub for cable • No oiling needed • Drop forged steel hooks • Removable, reversible "Safety Handle" that bends before any part of hoist is overloaded • Automatic load lowering, with positive control for safety • No slipping brakes • Low first cost • Simple, rugged repair parts easy to install ...factory service never required.

Write our York, Pa., Office for Bulletin DH-163A for full story

ACCO

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

for Better Values

an invitation to patronage...

the B N BOOTH

In thousands of locations, B-N Booths have demonstrated their customer appeal and have substantially increased revenues. No detail of materials, design, installation, maintenance and economy has been too small to receive careful attention of our designers. Lightweight durability in a wide variety of attractive arrangements.

Only 326 lbs. shipping weight

Benner-Nawman, Inc.

3421 HOLLIS STREET • OAKLAND 8, CALIFORNIA

For details, write or contact your Distributor

YOU'LL WANT TO READ . . .

"Stability in Oscillators for Wire Line Carrier"

Authored by Sherman B. Weiner, Carrier engineer, this 8-page illustrated monograph exhaustively discusses the whole problem of oscillator stability in its application to wire line carriers.

Emphasis is given to such subjects as design and fabrication of coils, treating of metallic cores, compensating factors in sending or receiving circuit and similar matters which the carrier engineer meets daily.

Copies have been distributed to a known list of operating company technicians. If you have not received yours, just request the October issue of "The CARRIER" from

STROMBERG-CARLSON® COMPANY

A Division of General Dynamics Corporation

Rochester 3, New York

Difficult then was the automatic searching for open numbers with private branch exchanges which Americans take for granted, where the listed number being busy, the search is then made for an open number. The Japanese wouldn't take them consecutively however, and the hodgepodge meant that one concern with 300 numbers had every one of them listed in the telephone book, and they bore no numerical relationship with one another. To call that company meant to keep dialing every number listed until one was found free.

Cross-bar equipment eliminates this problem. Private switchboards no longer require consecutive numbers so that the unlucky ones can be used to support the principal "lucky" number without anyone knowing the difference.

The installation at Takasaki is in itself historic. It is on the site of an ancient feudal fortress, the moats still being in existence. The castle itself was a communications center 800 years ago when its towers were equipped with large balls which were raised and lowered to convey messages.

Takasaki and its two satellite exchanges were installed as the first part of a complete renovation and expansion of Japanese telephone system. It is centrally located and will be the center of attention, serving as a classroom for telephone experts throughout Japan.

Cook Electric Moves to New Main Frame Plant

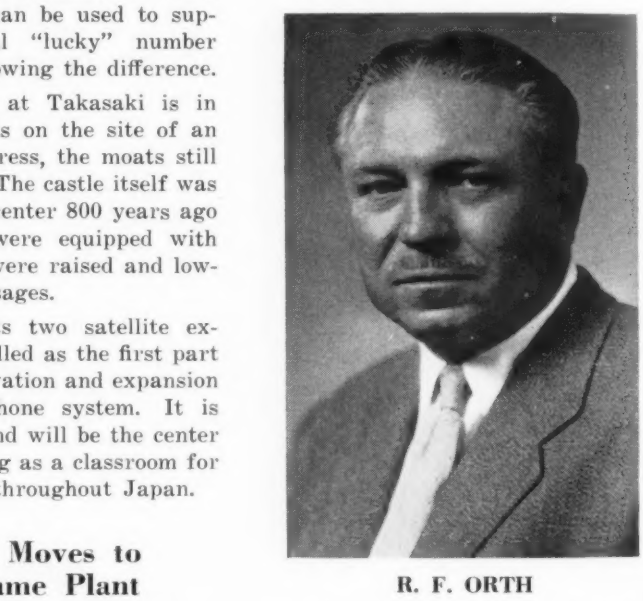
The Cook Electric Co. recently moved its telephone main frame steel fabrication and woodworking operations to a new location at 3415 Belmont Ave., Chicago.

The plant, which houses these operations only, is required because of the increased demand for Cook main frames of both the bolted and welded types. The engineering, drafting, and all production operations are now conducted at the new location.

R. F. Orth Appointed Head Of J-M's New Pipe Division

Johns-Manville Corp. will split its present industrial products division into three new operating divisions, the pipe division, packings and friction materials division and industrial insulations division.

General manager of the new pipe division will be Robert F. Orth who has also been elected vice president of Johns-Manville Sales Corp., it was announced by A. R. Fisher, president of Johns-Manville Corp. Mr. Orth had been manager of the J-M Transite pipe department since 1946.



R. F. ORTH

New location of Cook Electric Co.'s main frame steel fabrication and woodworking.

J-M products for which Mr. Orth will have production and sales responsibility include Transite asbestos-cement pressure, sewer, house and electrical conduit pipe products, and asbestos pipe line felts.

Other division general managers named by Mr. Fisher are Francis J. Wakem, industrial packings and friction materials division and Don L. Hinmon, industrial insulations division.

The expansion in organization, which becomes completely effective Jan. 1, 1956, continues the decentralization of operations started in 1946 and backed by a continuing plant and mine expansion program in which about 20 million dollars has been invested each year since the end of World War II.

Mr. Orth's staff for the new pipe division will include T. R. Turnbull, production manager, who has been elected vice president of Johns-Manville Products Corp., and George R. R. Wahl, merchandise manager, and John H. Goodwin, general sales manager, who have been elected vice presidents of Johns-Manville Sales Corp.

Mr. Orth, who is a mechanical engineering graduate of Texas A. & M. College, joined Johns-Manville in 1924 as an acoustical engineer. He has been associated with Johns-Manville's transite pipe business since 1934.

Stromberg Appoints Fairly To Head Kansas City Office

R. Fred Fairly has been appointed manager of telephone sales at the Kansas City office of the Stromberg-Carlson Co., a division of General Dynamics Corp.

Announcement of his appointment was made by T. C. Thompson, telephone sales manager of Stromberg-Carlson. In his new capacity Mr. Fairly succeeds Arthur B. Preble, who retired earlier this month.

Mr. Fairly has served as assistant manager of telephone sales in the company's Kansas City office for the past several months. Previously he had been senior sales engineer in Stromberg-Carlson's San Francisco office.

Mr. Fairly was born in Oakland, Cal., received his early education in Long Beach, and was graduated from Texas Technological College in Lubbock, Tex. He has been associated with the telephone business since his earliest working days during summer vacations while he was in high school. His first employment was with the old Associated Telephone Co., at San Bernardino, Cal., and later he also worked for Southwestern Associated (now General Telephone Co. of the Southwest) in that firm's Lubbock district.

His first full-time job was with the Haskell (Tex.) Telephone Co., and later he was in plant engineering in Lubbock, and Santa Monica, Cal. He joined Stromberg-Carlson's research department in 1942, subsequently transferred to the sales department working in the Northwest, and was sales engineer at the San Francisco office from July, 1947, until his transfer to Kansas City early this year.

Mr. Fairly holds a California license

R. Fred Fairly (left) is being congratulated on his appointment as manager of telephone sales at the Stromberg-Carlson Co. Kansas City office, by Arthur B. Preble who recently retired from that position. Looking on (left to right) are: T. C. Thompson, Stromberg-Carlson's telephone sales manager; Arthur F. Gibson, corporate secretary, and John H. Voss, vice president, telephone division.

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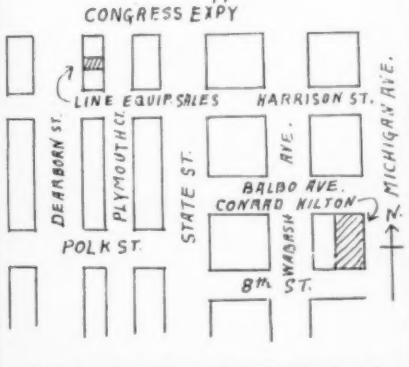

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as a professional engineer, is a member of A.I.E.E., and of the Armed Forces Communications Association.

Western Electric Plans Use Of Aluminum in Cable

Spiraling copper prices and repeated shortages in the supply of the metal have caused the Western Electric Co., one of the nation's largest users of copper, to move ahead with a definite engineering development program looking toward the substitution of aluminum for copper in its manufacture of telephone cable, it was announced on Sept. 22. Initially, facilities are being set up to develop suitable processes for quantity production of aluminum conductors for certain sizes of telephone cables. This program will be stepped up by converting more facilities now used for drawing copper wire to the extent dictated by future over-all economic and supply considerations.

Western Electric made it known that its decision to undertake this program was influenced by mounting concern over sharply rising copper prices, the disruption in production schedules which shortages have caused and the success it has had in its recent experiments with the use of aluminum wire.

As part of its exploratory work in the last three years, Western Electric has produced several billion conductor feet of cable in which aluminum was substituted for copper. In use, this cable has performed satisfactorily and experience gained in the trial installations provided answers to splicing and other problems related to the substitution.

Besides relieving the company's dependence upon one metal, its program of substituting aluminum for copper will result in material savings based upon present prices of the two metals. Copper presently is selling at 258 per cent above levels prevailing in January 1946, Western Electric reported. The rise in the price of aluminum in this same period has been only about 63 per cent. Furthermore, aluminum prices have been subject to less violent fluctuations.

Nevada Commission Grants Authority for Rate Raise

Nevada Public Service Commission granted the Southern Nevada Telephone Co., Las Vegas, permission to raise its rates 40 per cent in the Las Vegas area, effective Sept. 22, to yield $382,000 in additional annual company revenue (TELEPHONY, Sept. 10, p. 32).

The new rates were granted for a year, at the end of which the commission will re-examine the rates against the company's operating expenses under the new automatic system.

The company was ordered to file monthly financial reports, plus reports on the complaints it receives and on the progress it makes in filling back orders.

The commission said a rate increase was needed because of the telephone company's financial difficulties and because of its need for additional outside capital to meet its present obligations to subscribers and to fill its backlog of orders.

The new rates will not afford the company a rate of return on its investment in excess of 5.6 per cent, the commission said.

The advance in rates does not become effective at Boulder City until the dial service conversion is completed there.

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